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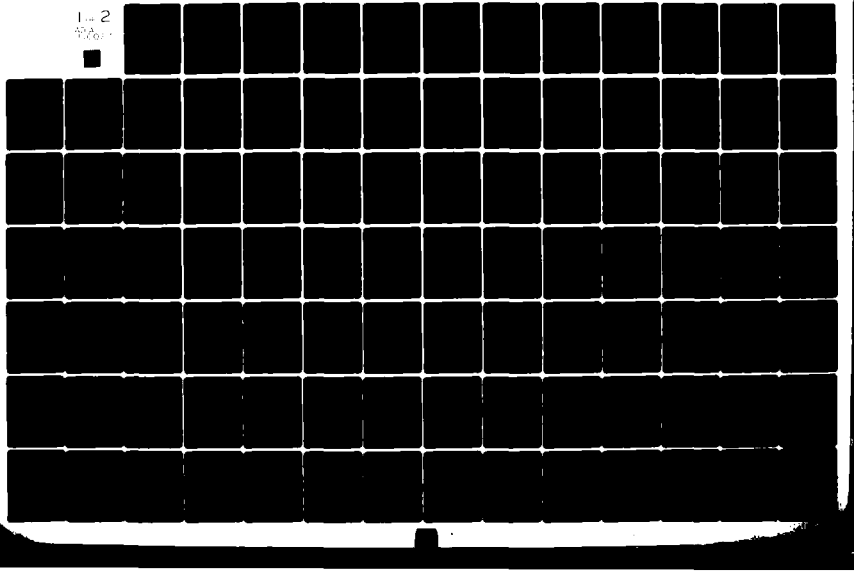
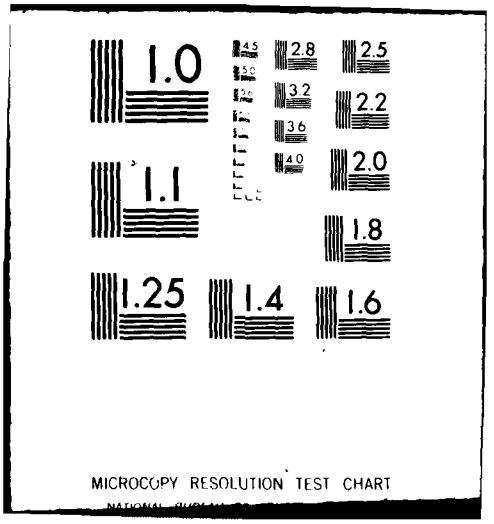
UNCLASSIFIED USAAVRADCOM-TR-82-D-8 NL

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USAAVRADCOM-TR-82-D-8

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DEVELOPMENT OF A STRUCTURAL INTEGRITY RECORDING SYSTEM (SIRS) FOR U. S. ARMY AH-1S HELICOPTERS

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May 1982

Final Report for Period August 1981 - May 1982

Prepared for

APPLIED TECHNOLOGY LABORATORY
U. S. ARMY RESEARCH AND TECHNOLOGY LABORATORIES (AVRADCOM)
Fort Eustis, Va. 23604

82 06 28 038

APPLIED TECHNOLOGY LABORATORY POSITION STATEMENT

This report was prepared by Technology Incorporated under Contract DAAK51-81-C-0035. The report describes the Fatigue Damage Assessment System (FDAS) and the results of processing the Flight Condition Data from five AH-1S aircraft. Data was obtained under Contract DAAJC2-77-C-0079. The results of this program will be used in developing a usage monitoring system for Army aircraft.

Duane M. Saylor of the Structures Technical Area, Aeronautical Technology Division, served as project engineer on this effort.

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1 REPORT NUMBER USAAVRADCOM TR 82-D-8	2 GOVT ACCESSION NO. AD-A126 027	3 RECIPIENT'S CATALOG NUMBER
4 TITLE (and Subtitle) DEVELOPMENT OF A STRUCTURAL INTEGRITY RECORDING SYSTEM (SIRS) FOR U.S. ARMY AH-1S HELICOPTERS		5 TYPE OF REPORT & PERIOD COVERED Final Report: August 1981-May 1982 6 PERFORMING ORG. REPORT NUMBER
7 AUTHOR(s) James G. Dotson Axel W. Kolb		8 CONTRACT OR GRANT NUMBER(s) DAAK51-81-C-0035
9 PERFORMING ORGANIZATION NAME AND ADDRESS Technology Incorporated 3821 Colonel Glenn Highway Dayton, Ohio 45431		10 PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 62209A1L162209AH76 00 42 EK
11 CONTROLLING OFFICE NAME AND ADDRESS Applied Technology Laboratory, U.S. Army Research and Development Laboratories (AVRADCOM) Fort Eustis, VA 23604		12 REPORT DATE May 1982 13 NUMBER OF PAGES 128
14 MONITORIN AGENCY NAME & ADDRESS(if different from Controlling Office)		15 SECURITY CLASS. (of this report) Unclassified 15a DECLASSIFICATION/DOWNGRADING SCHEDULE

16 DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited.

17 DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18 SUPPLEMENTARY NOTES

19 KEY WORDS (Continue on reverse side if necessary and identify by block number)

Helicopters
AH-1S
Structural Integrity Recording System
Development
Flight Condition Monitoring
Fatigue Damage Assessment
Dynamic Components
Lift Link

20 ABSTRACT (Continue on reverse side if necessary and identify by block number)

A follow-on research and development program to implement a Structural Integrity Recording System (SIRS) for the Army AH-1S helicopter was conducted by developing a computer program to reduce recorded aircraft usage data. The program, titled Fatigue Damage Assessment System (FDAS), was designed to run on the AVRADCOM computer. An improved lift-link-mounted strain sensor was also developed. The sensor was laboratory-tested and deemed ready for follow-on application testing in regard to monitoring helicopter gross weight, and take-off and landing detection.

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PREFACE

This report documents the results of development work to modify the AH-1S helicopter Structural Integrity Recording System (SIRS). The work was performed by Technology Incorporated, Dayton, Ohio under Contract DAAK51-81-C-0035, which was sponsored by the Applied Technology Laboratory, U.S. Army Research and Technology Laboratories (AVRADCOM). The Project Monitor for the Army was Mr. Duane Saylor.

The principal Technology Incorporated personnel conducting this program were J. Dotson, Project Engineer; A. Kolb, Senior Aeronautical Engineer; and M. Jackson, Computer Programmer.

This report contains a discussion of all technical aspects of the program as well as fatigue life information composed from flight test data.

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INTRODUCTION

The work reported is part of a continuing program to reduce cost and improve the effectiveness of U.S. Army helicopter operations. Previous efforts in this area were concerned with the development of a Structural Integrity Recording System (SIRS) for AH-1G and AH-1S helicopters. In this report the development of a computer program capable of accepting the data from the SIRS recorder for the purpose of assessing accumulated fatigue damage to critical AH-1S helicopter components is described. In addition, the development and testing of a lift-link-based sensor system for helicopter gross weight measurements is discussed.

The efforts described in this report complete the development of a fatigue damage assessment system which can permit the full utilization of costly dynamic helicopter components.

STRUCTURAL INTEGRITY RECORDING SYSTEM OVERVIEW

The SIRS system consists of an airborne microprocessor-based recorder, a portable flight-line data retrieval unit, and a data processing package. The recorder monitors various flight parameters and stores preselected types of operational data within its nonvolatile solid-state memory. Data are retrieved by a portable flight-line retrieval unit which transfers the recorded data onto miniature tape cassettes. Each cassette can store the average monthly operational data of 50 helicopters. The data processing package, called Fatigue Damage Assessment System (FDAS), reduces the recorded helicopter data to calculate incremental fatigue damage for selected fatigue-critical components.

APPROACH

The contract performance consisted of three tasks. Task A included definition of the FDAS component damage equations for

the AH-1S helicopter. During Task B the FDAS program was used to reduce data from flight tests reported in Reference 1. The redesign and testing of an improved lift-link strain transducer system was performed under Task C.

Task A was an adaptation of the fatigue damage assessment program previously developed for components of the AH-1G helicopter. The functional aspects of the AH-1G program were maintained but a new set of damage rate coefficients and a new grouping of manufacturer's design spectrum flight conditions were defined. A two-step approach was adopted whereby a preliminary FORTRAN computer program was written for an in-house DEC PDP-11/70 computer and then, after testing, the program was modified to run on the AVSCOM IBM 360 computer.

The lift-link gross weight measurement concept was tried during the AH-1G and AH-1S data recording programs. However, the data obtained lacked consistency which was assumed to be caused by problems with the attachment of the strain sensor. For this reason, the sensor brackets were redesigned to assure positive attachment to the lift link.

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[1] Dotson, J.G., and Kolb, A.W., "Structural Integrity Recording System (SIRS) for U.S. Army AH-1S Helicopters," Technology Incorporated, USAAVRADCOM Technical Report TR-81-D-6, Applied Technology Laboratory, U.S. Army Research and Technology Laboratories (AVRADCOM), Ft. Eustis, VA, March 1981, AD A098236.

SUMMARY OF FLIGHT CONDITION MONITORING METHODOLOGY

The flight condition monitoring (FCM) method for fatigue damage assessment is based on the following definitions. Each flight condition category (FCC) represents one or several flight conditions which are defined in terms of specific combinations of flight parameters. The damage accumulated due to each flight condition can be determined when the loads during each flight condition and the number of flight condition occurrences, as well as the [illegible] of the component are known. To ensure the [illegible] of each flight condition category is conservative, the [illegible] condition damage rate within the [illegible] category is chosen. Then the component damage [illegible] during [illegible] may be computed by [illegible] the sum of the flight condition category increments, which yield the total component damage. The total [illegible] is calculated by equation (2), and the [illegible] is predicted by equation (3).

$$D = \sum_{i=1}^{I} D_i = \sum_{k=1}^{K} f_k T_k \qquad (1)$$

$$f_t = \sum_{k=1}^{K} f_k \qquad (2)$$

$$FL = \frac{1}{D} \qquad (3)$$

where: D = total damage to a component accumulated during exposure to the usage spectrum

D_k = component damage accrued during the k^{th} flight condition category

C_k = damage rate in k^{th} flight condition category for a particular component

T_k = amount of flight time spent in k^{th} flight condition category

T_t = total flight time

FL = component fatigue life

m = number of flight condition categories.

The FCM method of fatigue damage assessment requires analyzing the manufacturer's fatigue analysis to first define a technically feasible FCM system and then to establish damage rates for each component in each flight condition category. After these data have been developed and substantiated, the selected flight parameters can be monitored to assess the accrued fatigue damage of critical helicopter components susceptible to fatigue damage. 2 B

DEVELOPMENT OF A FATIGUE DAMAGE ASSESSMENT SYSTEM (FDAS) FOR AH-1S HELICOPTERS

Under Contract DAAJ02-75-C-0050 Technology Incorporated developed a Structural Integrity Recording System (SIRS) that consisted of a microprocessor-based data recorder, a microprocessor-based data retrieval unit, and a software package called FDAS (Fatigue Damage Assessment System). Using the Flight Condition Monitoring (FCM) concept, the airborne recorder collected aircraft usage data on the AH-1G Cobra. These data were then reduced by the AH-1G FDAS software package to obtain incremental fatigue damage to ten fatigue-critical components in the main and tail rotor systems.

In a follow-on contract, DAAJ02-77-C-0079, the data collection portion of SIRS was adapted to the AH-1S Cobra. Five recorders were modified and installed on aircraft at Fort Rucker, Alabama.

The physical similarity between the two aircraft and the close correspondence between the manufacturer's design utilization spectra, as outlined in Tables 1 and 2, meant that the concepts of the FCM system outlined in References 2 and 3 were almost directly applicable to the AH-1S. The similarity between

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[2] Johnson, R.B., Martin, G.L., and Moran, M.S., "A Feasibility Study for Monitoring Systems of Fatigue Damage to Helicopter Components," Technology Incorporated, USAAMRDL Technical Report 74-92, Eustis Directorate, U.S. Army Air Mobility Research and Development Laboratory, Ft. Eustis, VA, January 1975, AD A06641.

[3] Farrell, T.G., Johnson, R.B., and Tyler, M.C., - Technology Incorporated, "Structural Integrity Recording System (SIRS) for U.S. Army AH-1G Helicopters," USAAVRADCOM TR-80-D-15, Applied Technology Laboratory, U.S. Army Research and Technology Laboratories (AVRADCOM), Ft. Eustis, VA, March 1981, AD A097283.

TABLE 1. DESIGN UTILIZATION SPECTRUM, MODEL AH-1G HELICOPTER

Flight Conditions		% of Flight Time	
		Total	Gross Weight Breakdown
I. Ground Conditions			
A. Normal Start		0.5000	
B. Shutdown		0.5000	
II. IGE Maneuvers			
A. Takeoff			
1. Normal	L-GW		0.180
	M-GW		0.450
	H-GW		0.270
		0.9000	
2. Jump	L-GW		0.020
	M-GW		0.050
	H-GW		0.030
		0.1000	
B. Hovering			
1. Steady	L-GW		0.434
	M-GW		1.085
	H-GW		0.651
		2.1700	
2. Right Turn	L-GW		0.020
	M-GW		0.050
	H-GW		0.030
		0.1000	
3. Left Turn	L-GW		0.020
	M-GW		0.050
	H-GW		0.030
		0.1000	
4. Control Correction			
(A) Longitudinal	L-GW		0.002
	M-GW		0.005
	H-GW		0.003
		0.0100	
(B) Lateral	L-GW		0.002
	M-GW		0.005
	H-GW		0.003
		0.0100	
(C) Rudder	L-GW		0.002
	M-GW		0.005
	H-GW		0.003
		0.0100	
C. Sideward Flight			
1. To the Right	L-GW		0.050
	M-GW		0.125
	H-GW		0.075
		0.2500	
2. To the Left	L-GW		0.050
	M-GW		0.125
	H-GW		0.075
		0.2500	
D. Rearward Flight	L-GW		0.050
	M-GW		0.125
	H-GW		0.075
		0.2500	

TABLE 1. DESIGN UTILIZATION SPECTRUM, MODEL AH-1G HELICOPTER (Continued)

Flight Conditions			% of Flight Time	
			Total	Gross Weight Breakdown
E. Acceleration				
Hover to Climb A/S		L-GW		0.100
		M-GW		0.250
		H-GW		0.150
			0.5000	
F. Deceleration				
1. Normal		L-GW		0.140
		M-GW		0.350
		H-GW		0.210
			0.7000	
2. Quick Stop		L-GW		0.050
		M-GW		0.150
		H-GW		0.090
			0.3000	
G. Approach and Landing		L-GW		0.200
		M-GW		0.500
		H-GW		0.300
			1.0000	
III. Forward Level Flight				
Airspeed	RPM			
A. 0.50 VH	314	L-GW		0.100
		M-GW		0.250
		H-GW		0.150
			0.5000	
	324	L-GW		0.900
		M-GW		2.250
		H-GW		1.350
			4.5000	
B. 0.60 VH	314	L-GW		0.040
		M-GW		0.100
		H-GW		0.060
			0.2000	
	324	L-GW		0.360
		M-GW		0.900
		H-GW		0.540
			1.8000	
C. 0.70 VH	314	L-GW		0.060
		M-GW		0.150
		H-GW		0.090
			0.3000	
	324	L-GW		0.540
		M-GW		1.350
		H-GW		0.810
			2.7000	
D. 0.80 VH	314	L-GW		0.300
		M-GW		0.750
		H-GW		0.450
			1.5000	
	324	L-GW		2.700
		M-GW		6.750
		H-GW		4.050
			13.5000	

TABLE 1. DESIGN UTILIZATION SPECTRUM, MODEL AH-1G HELICOPTER (Continued)

Flight Conditions			% of Flight Time	
			Total	Gross Weight Breakdown
E. 0.90 VH	314	L-GW		0.500
		M-GW		1.250
		H-GW		0.750
			2.5000	
	324	L-GW		4.500
		M-GW		11.250
		H-GW		6.750
			22.5000	
F. VH	314	L-GW		0.200
		M-GW		0.500
		H-GW		0.300
			1.0000	
	324	L-GW		1.800
		M-GW		4.500
		H-GW		2.700
			9.0000	
IV. Nonfiring Maneuvers				
A. Full Power Climb				
1 Normal		L-GW		0.800
		M-GW		2.000
		H-GW		1.200
			4.0000	
2. High-Speed		L-GW		0.200
		M-GW		0.500
		H-GW		0.300
			1.0000	
B. Maximum Rate Accel. Climb - Cruise A/S		L-GW		0.560
		M-GW		1.400
		H-GW		0.840
			2.8000	
C. Normal Turns				
1. To the Right				
(A) 0.5 VH		L-GW		0.200
		M-GW		0.500
		H-GW		0.300
			1.0000	
(B) 0.7 VH		L-GW		0.200
		M-GW		0.500
		H-GW		0.300
			1.0000	
(C) 0.9 VH		L-GW		0.400
		M-GW		1.000
		H-GW		0.600
			2.0000	
2. To the Left				
(A) 0.5 VH		L-GW		0.200
		M-GW		0.500
		H-GW		0.300
			1.0000	

TABLE 1. DESIGN UTILIZATION SPECTRUM, MODEL AH-1G HELICOPTER (Continued)

Flight Conditions		% of Flight Time Total	% of Flight Time Gross Weight Breakdown
(B) 0.7 VH	L-GW		0.200
	M-GW		0.500
	H-GW		0.300
		1.0000	
(C) 0.9 VH	L-GW		0.400
	M-GW		1.000
	H-GW		0.600
		2.0000	
D. 0.9 VH Control Corr.			
1. Longitudinal	L-GW		0.010
	M-GW		0.025
	H-GW		0.015
		0.0500	
2. Lateral	L-GW		0.010
	M-GW		0.025
	H-GW		0.015
		0.0500	
3. Rudder	L-GW		0.010
	M-GW		0.025
	H-GW		0.015
		0.0500	
E. Sideslip	L-GW		0.100
	M-GW		0.250
	H-GW		0.150
		0.5000	
F. Part Power Descent	L-GW		0.510
	M-GW		1.275
	H-GW		0.765
		2.5500	
Gunnery Maneuvers			
A. Firing in a Hover	L-GW		0.015
	M-GW		0.038
	H-GW		0.023
		0.0750	
B. Strafing in Accel. From a Hover	L-GW		0.010
	M-GW		0.025
	H-GW		0.015
		0.0500	
C. Gunnery Runs			
1. Point Target Runs			
(A) To 0.6 VL	L-GW		0.056
	M-GW		0.140
	H-GW		0.084
		0.2800	
(B) To 0.8 VL	L-GW		0.168
	M-GW		0.420
	H-GW		0.252
		0.8400	
(C) To 0.9 VL	L-GW		0.280
	M-GW		0.700
	H-GW		0.420
		1.4000	

TABLE 1. DESIGN UTILIZATION SPECTRUM, MODEL AH-1G HELICOPTER (Continued)

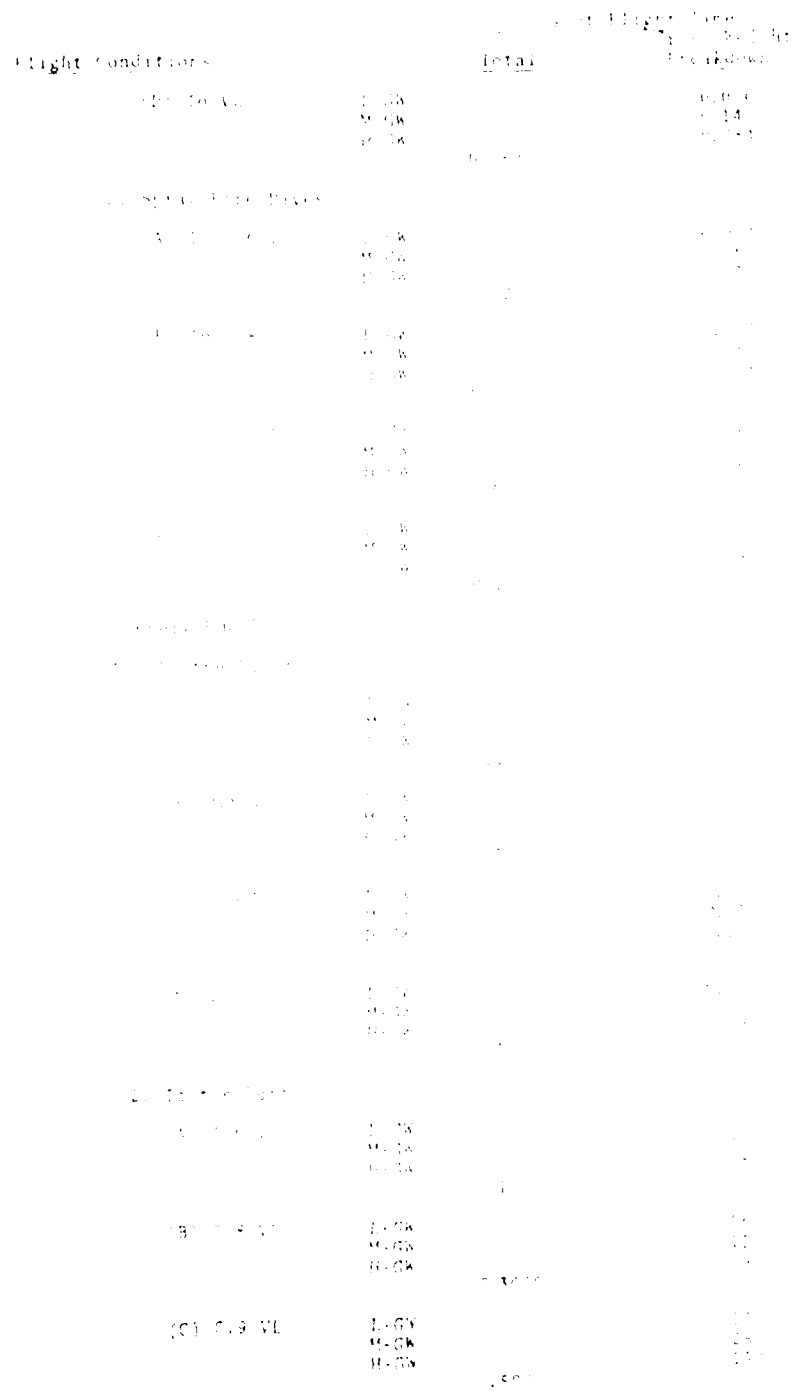

TABLE 1. DESIGN UTILIZATION SPECTRUM, MODEL AH-1G HELICOPTER (Continued)

Flight Conditions		% of Flight Time	
		Total	Gross Weight Breakdown
(D) VL	L-GW		0.020
	M-GW		0.050
	H-GW		0.030
		0.1000	
3. Symmetrical			
(A) 0.6 VL	L-GW		0.002
	M-GW		0.005
	H-GW		0.003
		0.0100	
(B) 0.8 VL	L-GW		0.006
	M-GW		0.015
	H-GW		0.009
		0.0300	
(C) 0.9 VL	L-GW		0.010
	M-GW		0.025
	H-GW		0.015
		0.0500	
(D) VL	L-GW		0.005
	M-GW		0.005
	H-GW		0.003
		0.0100	
E. Gunnery Turns			
1. To the Right			
(A) 0.5 VH	L-GW		0.075
	M-GW		0.188
	H-GW		0.113
		0.3750	
(B) 0.7 VH	L-GW		0.075
	M-GW		0.188
	H-GW		0.113
		0.3750	
(C) 0.9 VH	L-GW		0.150
	M-GW		0.375
	H-GW		0.225
		0.7500	
2. To the Left			
(A) 0.5 VH	L-GW		0.075
	M-GW		0.188
	H-GW		0.113
		0.3750	
(B) 0.7 VH	L-GW		0.075
	M-GW		0.188
	H-GW		0.113
		0.3750	
(C) 0.9 VH	L-GW		0.150
	M-GW		0.375
	H-GW		0.225
		0.7500	

TABLE 1. DESIGN UTILIZATION SPECTRUM, MODEL AH-1G HELICOPTER (Continued)

Flight Conditions		% of Flight Time Total	% of Flight Time Gross Weight Breakdown
F. S-Turns			
1. At 0.8 VH	L GW		0.040
	M-GW		0.100
	H GW		0.060
		0.2000	
2. At VH	L-GW		0.015
	M-GW		0.038
	H-GW		0.022
		0.0750	
VI. Power Transitions			
A. Power to Auto			
1. 0.5 VH	L-GW		0.010
	M-GW		0.025
	H-GW		0.015
		0.0500	
2. 0.7 VH	L-GW		0.025
	M-GW		0.063
	H-GW		0.038
		0.1250	
3. 0.9 VH	L-GW		0.035
	M-GW		0.088
	H-GW		0.053
		0.1750	
B. Auto to Power			
1. In Ground Effect	L-GW		0.030
	M-GW		0.075
	H-GW		0.045
		0.1500	
2. 0.4 VH	L-GW		0.020
	M-GW		0.050
	H-GW		0.030
		0.1000	
3. 0.6 VH	L-GW		0.015
	M-GW		0.038
	H-GW		0.023
		0.0750	
4. Max Auto A/S	L-GW		0.005
	M-GW		0.013
	H-GW		0.008
		0.0250	
VII. Autorotation			
A. Stabilized Flight			
1. 0.4 VH	L-GW		0.040
	M-GW		0.100
	H-GW		0.060
		0.2000	
2. 0.6 VH	L-GW		0.280
	M-GW		0.700
	H-GW		0.420
		1.4000	

TABLE 1. DESIGN UTILIZATION SPECTRUM, MODEL AH-1G HELICOPTER (Concluded)

Flight Conditions		% of Flight Time	
		Total	Gross Weight Breakdown
3. Max Auto A/S	L-GW		0.060
	M-GW		0.150
	H-GW		0.090
		0.3000	
B. Auto Turns			
1. To the Right			
(A) 0.4 VH	L-GW		0.010
	M-GW		0.025
	H-GW		0.015
		0.0500	
(B) 0.6 VH	L-GW		0.080
	M-GW		0.200
	H-GW		0.120
		0.4000	
(C) Max Auto A/S	L-GW		0.010
	M-GW		0.025
	H-GW		0.015
		0.0500	
2. To the Left			
(A) 0.4 VH	L-GW		0.010
	M-GW		0.025
	H-GW		0.015
		0.0500	
(B) 0.6 VH	L-GW		0.080
	M-GW		0.200
	H-GW		0.120
		0.4000	
(C) Max Auto A/S	L-GW		0.010
	M-GW		0.025
	H-GW		0.015
		0.0500	
C. Auto Landing	L-GW		0.050
	M-GW		0.125
	H-GW		0.075
		0.2500	

TABLE 2. DESIGN UTILIZATION SPECTRUM - MODEL AH-1S

Flight Conditions		% of Flight Time	
		Total	Gross Weight Breakdown
I. Ground Conditions			
A. Normal Start		.5000	
B. Shutdown W/Coll.		.5000	
II. IGE Maneuvers			
A. Takeoff			
1. Normal	L-GW		.1800
	M-GW		.4500
	H-GW		.2700
		.9000	
2. Jump	L-GW		.0200
	M-GW		.0500
	H-GW		.0300
		.1000	
B. Hovering, RPM			
1. Steady-294	L-GW		.1000
	M-GW		.2500
	H-GW		.1500
		.5000	
2. Steady-304	L-GW		.1000
	M-GW		.2500
	H-GW		.1500
		.5000	
3. Steady-314	L-GW		.0940
	M-GW		.2350
	H-GW		.1410
		.4700	
4. Steady-324	L-GW		.1400
	M-GW		.3500
	H-GW		.2100
		.7000	
5. Right Turn	L-GW		.0200
	M-GW		.0500
	H-GW		.0300
		.1000	

TABLE 2. DESIGN UTILIZATION SPECTRUM - MODEL AH-1S (Continued)

Flight Conditions		% of Flight Time Total	% of Flight Time Gross Weight Breakdown
6. Left Turn	L-GW		.0200
	M-GW		.0500
	H-GW		.0300
		.1000	
7. Control Corrections			
(A) Longitudinal	L-GW		.0020
	M-GW		.0050
	H-GW		.0030
		.0100	
(B) Lateral	L-GW		.0020
	M-GW		.0050
	H-GW		.0030
		.0100	
(C) Pedal	L-GW		.0020
	M-GW		.0050
	H-GW		.0030
		.0100	
C. Sidward Flight			
1. To the Right	L-GW		.0500
	M-GW		.1250
	H-GW		.0750
		.2500	
2. To the Left	L-GW		.0500
	M-GW		.1250
	H-GW		.0750
		.2500	
D. Rearward Flight	L-GW		.0500
	M-GW		.1250
	H-GW		.0750
		.2500	
E. Acceleration			
1. Hover to Climb A/S	L-GW		.1000
	M-GW		.2500
	H-GW		.1500
		.5000	

TABLE 2. DESIGN UTILIZATION SPECTRUM - MODEL AH-1S (Continued)

Flight Conditions		% of Flight Time	
		Total	Gross Weight Breakdown
F. Deceleration			
1. Normal	L-GW		.1400
	M-GW		.3500
	H-GW		.2100
		.7000	
2. Quick Stop	L-GW		.0600
	M-GW		.1500
	H-GW		.0900
		.3000	
G. Approach and Landing	L-GW		.2000
	M-GW		.5000
	H-GW		.3000
		1.0000	
III. Tow Maneuvers			
A. Pop-up from Hover	M-GW		.2500
	H-GW		.2500
		.5000	
B. Hover OGE	M-GW		1.0000
	H-GW		1.0000
		2.0000	
C. Lateral Acceleration and Reversal			
1. 50 Kts Right/Left	M-GW		.2500
	H-GW		.2500
		.5000	
2. 50 Kts Left/Right	M-GW		.2500
	H-GW		.2500
		.5000	
D. Abrupt Descent to Hover IGE	M-GW		.2500
	H-GW		.2500
		.5000	

TABLE 2. DESIGN UTILIZATION SPECTRUM - MODEL AH-1S (Continued)

Flight Conditions			% of Flight Time	
			Total	Gross Weight Breakdown
E. 90-Degree Getaway from Hover OGE				
1. To the Right		M-GW		.1250
		H-GW		.1250
			.2500	
2. To the Left		M-GW		.1250
		H-GW		.1250
			.2500	
F. Rapid Deceleration to Hover OGE		M-GW		.2500
		H-GW		.2500
			.5000	
IV. Forward Level Flight				
	Airspeed	RPM		
A.	0.5 VH	314	L-GW	.1000
			M-GW	.2500
			H-GW	.1500
			.5000	
		324	L-GW	.9000
			M-GW	2.2500
			H-GW	1.3500
			4.5000	
B.	0.6 VH	314	L-GW	.0400
			M-GW	.1000
			H-GW	.0600
			.2000	
		324	L-GW	.3600
			M-GW	.9000
			H-GW	.5400
			1.8000	
C.	0.7 VH	314	L-GW	.0600
			M-GW	.1500
			H-GW	.0900
			.3000	
		324	L-GW	.5400
			M-GW	1.3500
			H-GW	.8100
			2.7000	

TABLE 2. DESIGN UTILIZATION SPECTRUM - MODEL AH-1S (Continued)

Flight Conditions	Airspeed	RPM		% of Flight Time Total	% of Flight Time Gross Weight Breakdown
D.	0.8 VH	314	L-GW		.3000
			M-GW		.7500
			H-GW		.4500
				1.5000	
		324	L-GW		2.7000
			M-GW		6.7500
			H-GW		4.0500
				13.5000	
E.	0.9 VH	314	L-GW		.5000
			M-GW		1.2500
			H-GW		.7500
				2.5000	
		324	L-GW		4.5000
			M-GW		11.2500
			H-GW		6.7500
				22.5000	
F.	VH	314	L-GW		.2000
			M-GW		.5000
			H-GW		.3000
				1.0000	
		324	L-GW		1.8000
			M-GW		4.5000
			H-GW		2.7000
				9.0000	
V.	Nonfiring Maneuvers				
A.	Full Power Climb				
1.	To 70 Knots		L-GW		.8000
			M-GW		2.0000
			H-GW		1.2000
				4.0000	
2.	To 120 Knots		L-GW		.2000
			M-GW		.5000
			H-GW		.3000
				1.0000	

TABLE 2. DESIGN UTILIZATION SPECTRUM - MODEL AH-1S (Continued)

Flight Conditions		% of Flight Time	
		Total	Gross Weight Breakdown
B. Maximum Rate Accel. Climb to 0.9 VH	L-GW		.5600
	M-GW		1.4000
	H-GW		.8400
		2.8000	
C. Normal Turns			
1. To the Right			
(A) 0.5 VH	L-GW		.2000
	M-GW		.5000
	H-GW		.3000
		1.0000	
(B) 0.7 VH	L-GW		.2000
	M-GW		.5000
	H-GW		.3000
		1.0000	
(C) 0.9 VH	L-GW		.4000
	M-GW		1.0000
	H-GW		.6000
		2.0000	
2. To the Left			
(A) 0.5 VH	L-GW		.2000
	M-GW		.5000
	H-GW		.3000
		1.0000	
(B) 0.7 VH	L-GW		.2000
	M-GW		.5000
	H-GW		.3000
		1.0000	
(C) 0.9 VH	L-GW		.4000
	M-GW		1.0000
	H-GW		.6000
		2.0000	
D. 0.9 VH Control Corrections			
1. Longitudinal	L-GW		.0100
	M-GW		.0250
	H-GW		.0150
		.0500	

TABLE 2. DESIGN UTILIZATION SPECTRUM - MODEL AH-1S (Continued)

Flight Conditions		% of Flight Time	
		Total	Gross Weight Breakdown
2. Lateral	L-GW		.0100
	M-GW		.0250
	H-GW		.0150
		.0500	
3. Rudder	L-GW		.0100
	M-GW		.0250
	H-GW		.0150
		.0500	
E. Sideslip			
1. To the Left	L-GW		.0500
	M-GW		.1250
	H-GW		.0750
		.2500	
2. To the Right	L-GW		.0500
	M-GW		.1250
	H-GW		.0750
		.2500	
F. Part. Power Descent	L-GW		.5100
	M-GW		1.2750
	H-GW		.7650
		2.5500	
VI. Gunnery Maneuvers			
A. Firing in a Hover	L-GW		.0150
	M-GW		.0375
	H-GW		.0225
		.0750	
B. Strafing in Accel. from a Hover	L-GW		.0100
	M-GW		.0250
	H-GW		.0150
		.0500	
C. Gunnery Runs			
1. Pt. Target Dives			
(A) To 0.6 VL	L-GW		.0112
	M-GW		.0280
	H-GW		.0168
		.0560	

TABLE 2. DESIGN UTILIZATION SPECTRUM - MODEL AH-1S (Continued)

Flight Conditions		% of Flight Time	
		Total	Gross Weight Breakdown
(B) To 0.8 VL	L-GW		.0336
	M-GW		.0840
	H-GW		.0504
		.1680	
(C) To 0.9 VL	L-GW		.0560
	M-GW		.1400
	H-GW		.0840
		.2800	
(D) To VL	L-GW		.0112
	M-GW		.0280
	H-GW		.0168
		.0560	
2. Spray Fire Dives			
(A) To 0.6 VL	L-GW		.0048
	M-GW		.0120
	H-GW		.0072
		.0240	
(B) To 0.8 VL	L-GW		.0120
	M-GW		.0300
	H-GW		.0180
		.0600	
(C) To 0.9 VL	L-GW		.0240
	M-GW		.0600
	H-GW		.0360
		.1200	
(D) To VL	L-GW		.0048
	M-GW		.0120
	H-GW		.0072
		.0240	
D. Gunnery Run P/U			
1. To the Right			
(A) 0.6 VL	L-GW		.0040
	M-GW		.0100
	H-GW		.0060
		.0200	

TABLE 2. DESIGN UTILIZATION SPECTRUM - MODEL AH-1S (Continued)

Flight Conditions		% of Flight Time	
		Total	Gross Weight Breakdown
(B) 0.8 VL	L-GW		.0120
	M-GW		.0300
	H-GW		.0180
		.0600	
(C) 0.9 VL	L-GW		.0200
	M-GW		.0500
	H-GW		.0300
		.1000	
(D) VL	L-GW		.0040
	M-GW		.0100
	H-GW		.0060
		.0200	
2. To the Left			
(A) 0.6 VL	L-GW		.0040
	M-GW		.0100
	H-GW		.0060
		.0200	
(B) 0.8 VL	L-GW		.0120
	M-GW		.0300
	H-GW		.0180
		.0600	
(C) 0.9 VL	L-GW		.0200
	M-GW		.0500
	H-GW		.0300
		.1000	
(D) VL	L-GW		.0040
	M-GW		.0100
	H-GW		.0060
		.0200	
3. Symmetrical			
(A) 0.6 VL	L-GW		.0004
	M-GW		.0010
	H-GW		.0006
		.0020	
(B) 0.8 VL	L-GW		.0012
	M-GW		.0030
	H-GW		.0018
		.0060	

TABLE 2. DESIGN UTILIZATION SPECTRUM - MODEL AH-1S (Continued)

Flight Conditions		% of Flight Time	
		Total	Gross Weight Breakdown
(C) 0.9 VL	L-GW		.0020
	M-GW		.0050
	H-GW		.0030
		.0100	
(D) VL	L-GW		.0004
	M-GW		.0010
	H-GW		.0006
		.0020	
E. Gunnery Turns			
1. To the Right			
(A) 0.5 VH	L-GW		.0750
	M-GW		.1875
	H-GW		.1125
		.3750	
(B) 0.7 VH	L-GW		.0750
	M-TW		.1875
	H-GW		.1125
		.3750	
(C) 0.9 VH	L-GW		.1500
	M-GW		.3750
	H-GW		.2250
		.7500	
2. To the Left			
(A) 0.5 VH	L-GW		.0750
	M-GW		.1875
	H-GW		.1125
		.3750	
(B) 0.7 VH	L-GW		.0750
	M-GW		.1875
	H-GW		.1125
		.3750	
(C) 0.9 VH	L-GW		.1500
	M-GW		.3750
	H-GW		.2250
		.7500	

TABLE 2. DESIGN UTILIZATION SPECTRUM - MODEL AH-1S (Continued)

Flight Conditions		% of Flight Time	
		Total	Gross Weight Breakdown
F. S-Turns			
1. At 0.8 VH	L-GW		.0400
	M-GW		.1000
	H-GW		.0600
		.2000	
2. At VH	L-GW		.0150
	M-GW		.0375
	H-GW		.0225
		.0750	
VII. Power Transitions			
A. Power to Auto			
1. 0.5 VH	L-GW		.0100
	M-GW		.0250
	H-GW		.0150
		.0500	
2. 0.7 VH	L-GW		.0250
	M-GW		.0625
	H-GW		.0375
		.1250	
3. 0.9 VH	L-GW		.0350
	M-GW		.0875
	H-GW		.0525
		.1750	
B. Auto to Power			
1. In Ground Effect	L-GW		.0300
	M-GW		.0750
	H-GW		.0450
		.1500	
2. 0.4 VH	L-GW		.0200
	M-GW		.0500
	H-GW		.0300
		.1000	

TABLE 2. DESIGN UTILIZATION SPECTRUM - MODEL AH-1S (Continued)

Flight Conditions		% of Flight Time Total	% of Flight Time Gross Weight Breakdown
3. 0.6 VH	L-GW		.0150
	M-GW		.0375
	H-GW		.0225
		.0750	
4. Max Auto A/S	L-GW		.0050
	M-GW		.0125
	H-GW		.0075
		.0250	
VIII. Autorotation			
A. Stabilized Flight			
1. 0.4 VH	L-GW		.0374
	M-GW		.0935
	H-GW		.0561
		.1870	
2. 0.6 VH	L-GW		.2624
	M-GW		.6560
	H-GW		.3936
		1.3120	
3. Max. Auto A/S	L-GW		.0562
	M-GW		.1405
	H-GW		.0843
		.2810	
B. Auto Turns			
1. To the Right			
(A) 0.4 VH	L-GW		.0100
	M-GW		.0250
	H-GW		.0150
		.0500	
(B) 0.6 VH	L-GW		.0800
	M-GW		.2000
	H-GW		.1200
		.4000	

TABLE 2. DESIGN UTILIZATION SPECTRUM - MODEL AH-1S (Concluded)

Flight Conditions		% of Flight Time	
		Total	Gross Weight Breakdown
(C) Max. Auto A/S	L-GW		.0100
	M-GW		.0250
	H-GW		.0150
		.0500	
2. To the Left			
(A) 0.4 VH	L-GW		.0100
	M-GW		.0250
	H-GW		.0150
		.0500	
(B) 0.6 VH	L-GW		.0800
	M-GW		.2000
	H-GW		.1200
		.4000	
(C) Max. Auto A/S	L-GW		.0100
	M-GW		.0250
	H-GW		.0150
		.0500	
C. Auto Landing	L-GW		.0500
	M-GW		.1250
	H-GW		.0750
		.2500	

the two systems is most directly reflected in the monitored parameters and the definitions of the flight condition categories in terms of those monitored parameters. Reference 1 outlines the slight differences between the two on-board recording systems.

In addition to the fatigue analysis goals of the AH-1G system, other aspects concerned strictly with monitoring aircraft usage and with verifying data integrity were added to the AH-1S system. For comparison purposes, the data recording categories or "flight condition categories" for both aircraft are included in Tables 3 and 4.

The number of flight condition categories recorded for the AH-1S has been increased to 339. The bulk of the added flight condition categories involves monitoring rudder usage by recording a tri-variant table of rudder position, airspeed, and engine torque. These categories were meant to monitor rudder usage only and will play no part in the fatigue analysis portion of the AH-1S system. Also, certain features were added that serve to increase confidence in the recorded data. These features include the recording of parameter histogram information, the recording of more peak values, and the recording of ground time in addition to flight time. This additional information was intended to verify that the recorder was indeed active and monitoring the parameters during the whole flight. This need grew out of the AH-1G program where it was noticed that very little time was being recorded in the damaging flight condition categories, and often the recorded flight time was much less than the logbook entries. Like the tri-variant table entries, these additional flight condition categories serve no purpose in the fatigue analysis portion of the system.

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One change was made to the recording system software that does affect the fatigue analysis portion of the system. Some of the flight condition categories have been more finely divided to make the AH-1S system less conservative. For instance, the

TABLE 3. RECORDER FLIGHT CONDITION CATEGORIES, AH-1G

FCC No.*	FCC Description	Seconds Per Count	Occurrence
1,2,3	Normal Landings		OCC
4,5,6	Autorotative Landings		OCC
7,8,9	Symmetrical Dive A/S 0.70-0.85 VL	0.1	
10,11,12	Symmetrical Dive A/S 0.85-0.95 VL	0.1	
13,14,15	Symmetrical Dive A/S >0.95 VL	0.1	
16,17,18	Asymmetrical Dive A/S 0.70-0.85 VL	0.1	
19,20,21	Asymmetrical Dive A/S 0.85-0.95 VL	0.1	
22,23,24	Asymmetrical Dive A/S >0.95 VL	0.1	
25,26,27	Symmetrical Pullup A/S <0.70 VL	0.1	
28,29,30	Symmetrical Pullup A/S 0.70-0.85 VL	0.1	
31,32,33	Symmetrical Pullup A/S >0.85 VL	0.1	
34,35,36	Asymmetrical Pullup A/S <0.70 VL	0.1	
37,38,39	Asymmetrical Pullup A/S 0.70-0.85 VL	0.1	
40,41,42	Asymmetrical Pullup A/S 0.85-0.95 VL	0.1	
43,44,45	Asymmetrical Pullup A/S >0.95 VL	0.1	
46,47,48	Gunnery Turn A/S <0.65 VH	0.1	
49,50,51	Gunnery Turn A/S 0.65-0.80 VH	0.1	
52,53,54	Gunnery Turn A/S >0.80 VH	0.1	
55,56,57	Gun S-Turn A/S <0.90 VH	0.1	
58,59,60	Gun S-Turn A/S >0.90 VH	0.1	
61,62,63	Autorotative Turn Nz 1.5-1.5 G	0.1	
64,65,66	Autorotative Turn Nz >1.5 G	0.1	
67,68,69	Auto. to Power Transition Nz 1.5-1.5 G		OCC
70,71,72	Auto. to Power Transition Nz >1.5 G		OCC
73	Rotor Cycles		OCC
74	High-G Maneuvers		OCC
75,76,77	Flight Time	0.1	
78,79,80	Quick Stop	0.1	
81,82,83	Level Flight Low Speed, Medium Torque	0.1	
84,85,86	Level Flight Low Speed, High Torque	0.1	
87,88,89	Level Flight Medium Speed, Medium Torque	0.1	
90,91,92	Level Flight Medium Speed, High Torque	0.1	
93,94,95	Level Flight High Speed	0.1	
96,97,98	Autorotative Flight	0.1	
99,100,101	Normal Turns A/S <0.80 VH	0.1	
102,103,104	Normal Turns A/S >0.80 VH	0.1	
105	Nz Peak Value		
106	VL Peak Value		
107	Gross Weight Peak Value		
108	Nz Intercept		
109	Nz Slope		
110	Altitude Intercept		
111	Altitude Slope		
112	Airspeed Intercept		
113	Airspeed Slope		
114	Gross Weight Intercept		
115	Gross Weight Slope		
116	Torque Intercept		
117	Torque Slope		

* Note: Three flight condition category numbers on the same line indicate that the maneuver is recorded as a function of three gross weight ranges.

TABLE 4. RECORDER FLIGHT CONDITION CATEGORIES, AH-1S

FCC NO.*	FCC DESCRIPTION	SECONDS PER COUNT	OCCURRENCE
1,2,3	Gunnery Turn A/S <0.5 VH	0.1	
4,5,6	Gunnery Turn A/S 0.5-0.7 VH	0.1	
7,8,9	Gunnery Turn A/S 0.7-0.9 VH	0.1	
10,11,12	Gunnery Turn A/S >0.9 VH	0.1	
13,14,15	Gun S-Turn A/S <0.5 VH	0.1	
16,17,18	Gun S-Turn A/S 0.5-0.7 VH	0.1	
19,20,21	Gun S-Turn A/S 0.7-0.9 VH	0.1	
22,23,24	Gun S-Turn A/S >0.9 VH	0.1	
25,26,27	Hover A/S <0.3 VH	3.2	
28,29,30	Cruise A/S 0.3-0.5 VH	3.2	
31,32,33	Cruise A/S 0.5-0.6 VH	3.2	
34,35,36	Cruise A/S 0.6-0.7 VH	3.2	
37,38,39	Cruise A/S 0.7-0.8 VH	3.2	
40,41,42	Cruise A/S 0.8-0.9 VH	3.2	
43,44,45	Cruise A/S 0.9-1.0 VH	3.2	
46,47,48	Cruise A/S 1.0-1.1 VH	3.2	
49,50,51	Cruise A/S >1.1 VH	3.2	
52,53,54	Climb A/S >0.5 VH	3.2	
55,56,57	Descent A/S >0.5 VH	3.2	
58,59,60	Acceleration to Climb	3.2	
61,62,63	Flare	N/A	OCC
64,65,66	N_z Peaks 1.1-1.3 G	N/A	OCC
67,68,69	N_z Peaks 1.3-1.5 G	N/A	OCC
70,71,72	N_z Peaks 1.5-1.7 G	N/A	OCC
73,74,75	N_z Peaks >1.7 G	N/A	OCC
76-243	Tri-Variant Table	1.0	

(Values in Parentheses Recorded in Seconds)

FCC NO.	RUDDER (%)	A/S (VH)	TORQUE (PSI)
76	0-10	<0.5	<10
77	0-10	<0.5	10-20
78	0-10	<0.5	20-30
79	0-10	<0.5	30-40
80	0-10	<0.5	40-50
81	0-10	<0.5	>50
82-87	0-10	0.5-0.7	(6)
88-93	0-10	0.7-0.9	(6)
94-99	0-10	>0.9	(6)
100-123	10-20	(4)	(6)
124-147	20-40	(4)	(6)
148-171	40-60	(4)	(6)
172-195	60-80	(4)	(6)
196-219	80-90	(4)	(6)
220-243	>90	(4)	(6)

* Note: Three flight condition category numbers on the same line indicate that the maneuver is recorded as a function of three gross weight ranges.

TABLE 4. RECORDER FLIGHT CONDITION CATEGORIES, AH-1S (Continued)

FCC NO.	FCC DESCRIPTION	SECONDS PER COUNT	OCCURRENCE
244	Rotor Cycles		OCC
245	Normal Landings		OCC
246	Autorotative Landings		OCC
247	RPM Peak Value		
248	Torque Peak Value		
249	VL Peak Value		
250	VH Peak Value		
251	Density Altitude Peak		
252	Vertical Acceleration Peak		
253	OAT Maximum Value		
254	OAT Minimum Value		
255	Gross Weight Peak Value		
256	Roll Peak		
257	Unused Memory Locations		
258			
259			
260			
261			
262			
263			
264			
265			
266			
267,268,269	Gross Weight Histogram	0.1	
270	Ground Time	0.1	
271,272,273	Normal Turns A/S <0.5 VH	0.1	
274,275,276	Normal Turns A/S 0.5-0.7 VH	0.1	
277,278,279	Normal Turns A/S 0.7-0.9 VH	0.1	
280,281,282	Normal Turns A/S >0.9 VH	0.1	
283,284,285	Autorotative Turns N_z<1.5 G	0.1	
286,287,288	Autorotative Turns N_z>1.5 G	0.1	
289,290,291	Autorotative Time	0.1	
292,293,294	Symmetrical Dive	0.1	
295,296,297	Asymmetrical Dive	0.1	
298,299,300	Symmetrical Pullup	0.1	
301,302,303	Asymmetrical Pullup	0.1	
304	Density Alt Histogram <1K	0.1	
305	Density Alt Histogram 1-2K	0.1	
306	Density Alt Histogram 2-3K	0.1	
307	Density Alt Histogram 3-4K	0.1	
308	Density Alt Histogram 4-5K	0.1	
309	Density Alt Histogram 5-6K	0.1	
310	Density Alt Histogram 6-7K	0.1	
311	Density Alt Histogram 7-8K	0.1	
312	Density Alt Histogram 8-9K	0.1	
313	Density Alt Histogram 9-10K	0.1	
314	Density Alt Histogram 0.10K	0.1	
315	RPM Histogram <314	0.1	
316	RPM Histogram 314-319	0.1	
317	RPM Histogram 319-324	0.1	
318	RPM Histogram 324-329	0.1	
319	RPM Histogram 329-334	0.1	
320	RPM Histogram 334-339	0.1	
321	RPM Histogram >339	0.1	

TABLE 4. RECORDER FLIGHT CONDITION CATEGORIES, AH-1S (Concluded)

FCC NO.	FCC DESCRIPTION	SECONDS PER COUNT	OCCURRENCE
322	Torque Histogram <10 PSI	0.1	
323	Torque Histogram 10-20 PSI	0.1	
324	Torque Histogram 20-30 PSI	0.1	
325	Torque Histogram 30-40 PSI	0.1	
326	Torque Histogram 40-50 PSI	0.1	
327	Torque Histogram >50 PSI	0.1	
328	N_z Intercept		
329	N_z Slope		
330	Altitude Intercept		
331	Altitude Slope		
332	A/S Intercept		
333	A/S Slope		
334	Gross Weight Intercept		
335	Gross Weight Slope		
336	Torque Intercept		
337	Torque Slope		
338	Rudder Intercept		
339	Rudder Slope		

forward level flight categories have been increased from three divisions to nine divisions by airspeed. The net result is that the damage coefficient for each of the groups is the highest damage rate associated with a smaller number of flight conditions contained within each flight condition category. Therefore, the high damage rates associated with a few of the flight conditions affect smaller amounts of total time in the flight condition category.

In the current effort, under Contract DAAK51-81-C-0035, Technology Incorporated has developed an AH-1S FDAS software package using the manufacturer's fatigue substantiation report and the previously defined AH-1S flight condition category definitions. The system concentrates on 10 life-limited components in the main and tail rotor systems of the "Mod S" configuration AH-1S that are equivalent to the 10 components investigated in the AH-1G system. Correspondingly, the manufacturer's fatigue substantiation report for the Mod S configuration Cobra (Ref. 4) forms the basis for the derivation and the technical acceptance of the AH-1S FDAS system. Table 5 lists the 10 AH-1S components along with part number, manufacturer-computed fatigue life, and recommended retirement life.

TECHNICAL ACCEPTANCE CRITERIA

The final FCM system must be capable of predicting, for each component, fatigue lives that fall between a conservative lower bound and a realistic upper bound for each usage spectrum to which the aircraft is subjected. The application of the technical acceptance criteria requires the following: (1) the definition of the lower bounds for the component fatigue lives, (2) the derivation of realistic upper bounds for the component

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[4] Cassady, B., and Arlt, E., "Fatigue Life Substantiation of the Dynamic Components for the AH-1R/S Helicopter," Bell Helicopter Textron Report 209-099-466, November 1975.

TABLE 5. SELECTED FATIGUE-CRITICAL COMPONENTS OF THE AH-1S HELICOPTER

Nomenclature	Part Number	AH-1S Calculated Fatigue Life (hr)	Recommended Retirement Life (hr)
Main Rotor Blade Assembly	540-011-250-5	1,470	1,100
Main Rotor Yoke Extension	540-011-153-15	7,752	3,300
Main Rotor Retention Strap Fittings	540-011-113-1	2,760	2,200
Main Rotor Grip	540-011-154-5	38,683	Unlimited
Main Rotor Pitch Horn	209-011-109-5	14,801	6,600
Swashplate Drive Link	209-010-408-7	37,513	11,000
Swashplate Outer Ring/ Pin Assembly	209-010-403-1	4,465	3,300
Swashplate Inner Ring	209-010-402-1	9,979	3,300
Hydraulic Boost Cylinder	209-076-21-1	4,884	3,300
Tail Rotor Blade	212-010-750-11	Unlimited	2,400

fatigue lives, and (3) the establishment of one or more reasonable usage spectra to which the aircraft may be subjected.

As mentioned above, Table 5 includes the manufacturer's computed fatigue lives and the recommended retirement lives for the 10 selected components. The manufacturer's computations were based on the design utilization spectrum summarized in Table 2. Since such a spectrum is conventionally more severe than the actual utilization anticipated during the helicopter life, the computed fatigue lives are conservative. Also, as is apparent in Table 5, the recommended retirement lives are generally much shorter than the fatigue lives.

To conform with the philosophy in previous studies, the recommended retirement lives were defined as the lower bounds. For the purpose of this study, the design utilization spectrum was used as an input to FDAS, and the manufacturer's computed fatigue lives for that spectrum were defined as the upper bounds. Thus, for the AH-1S FDAS program to be technically acceptable, it must predict fatigue lives between the retirement lives and the manufacturer's calculated fatigue lives.

AH-1S FCM SYSTEM DESCRIPTION

Using the same procedures outlined in Reference 3, the parameters listed in Table 6 were previously determined to be the set of coordinated parameters which best describe the fatigue design spectrum in terms of a unique set of flight condition categories. These parameters differ from those for the AH-1G FCM system only in that Rudder Position was substituted for Pitch Attitude, and Gross Weight for the AH-1S is measured in the air using the lift-link-mounted sensor and not on the ground using a landing skid deflection technique with a software decrement of gross weight to compensate for fuel burnoff. Rudder Position was substituted for Pitch Attitude to enable the collection of the previously mentioned tri-variant table usage data. The elimination of Pitch Attitude as one of the monitored parameters

TABLE 6. MONITORED PARAMETERS FOR AH-1S RECORDING SYSTEM

System Parameters		Directly Monitored	Computed
Indicated Airspeed	(A/S)	X	
Pressure Altitude	(Hp)	X	
Outside Air Temperature	(T)	X	
Main Rotor Velocity	(MRV)	X	
Roll Attitude	(ϕ)	X	
Rudder Position	(R)	X	
Vertical Acceleration at C.G.	(n_z)	X	
Gross Weight	(GW)	X	
Engine Torque Pressure	(ET)	X	
Rate of Descent	(RD)		RD = f(Hp, time)
Max. Level Flight Airspeed	(VH)		VH = f(Hp, T)
Limit Airspeed	(VL)		VL = f(Hp, T)
Density Altitude	(H_d)		H_d = f(Hp, T)

necessitated deleting the Quick Stop flight condition category from the directly recorded categories and relegating it to one of the estimated flight condition categories. Tables 7 and 8 indicate the groupings of design spectrum flight conditions into recorder flight condition categories for the G-model and S-model helicopters respectively. As in the G-model FCM system, certain of the S-model flight condition categories do not specifically represent any of the flight conditions defined in the manufacturer's design utilization spectrum. These flight condition categories enhance understanding of the AH-1S operational usage spectrum as stated previously and therefore have an associated zero damage coefficient.

As can be seen from Table 8, there are 15 flight condition categories which are not directly recorded. These flight condition categories (FCC nos. 318-332) are reserved for estimations of time spent in making control corrections, quick stop and sideslip, and the new S-model tow maneuvers. Provision for estimating these times was prompted because these flight conditions could not be confidently detected with the chosen FCM system aircraft parameters and their damage rates were of sufficient magnitude to warrant due recognition. The estimation of hovering and high-speed control correction times is identical to the AH-1G technique outlined in Reference 3. This is reasonable since a comparison of Tables 1 and 2 indicates that the same percent time for the control correction flight conditions was assigned on both aircraft.

The quick stop and sideslip flight condition category is new for the AH-1S because without pitch attitude as a monitored parameter, quick stop cannot be reliably detected and directly recorded. In the AH-1G FCM system, sideslip was a nondamaging flight condition that was grouped with other flight conditions under the "flight clock time" flight condition categories. On the AH-1S, sideslip to the left is damaging to the main rotor

TABLE 7. AH-1G FCM SYSTEM SUMMARY

Flt. Cond. Cat. No. L-GW	Flt. Cond. Cat. No. M-GW	Flt. Cond. Cat. No. H-GW	Flight Condition Category Description	Type[1] Desig.	No.[2]	Flight Conditions Included Description
1	2	3	Flight Clock Time	T	2	Normal Takeoff (IGE)
					3	Jump Takeoff (IGE)
					4	Steady Hover (IGE)
					5	Hovering Right Turn (IGE)
					6	Hovering Left Turn (IGE)
					10	Sideward Flight to the Right (IGE)
					11	Sideward Flight to the Left (IGE)
					12	Rearward Flight (IGE)
					13	Acceleration Hover to Climb A/S (IGE)
					14	Normal Deceleration (IGE)
					41	Sideslip
					43	Firing in a Hover
					44	Strafing in Acceleration from a Hover
					45	Gunnery Run-Pt. Target Dive, 0.6 VI
					49	Gunnery Run-Spray Fire Dive, 0.6 VI
	4		Rotor Start/Stop	C	1*	Normal Start/Shutdown (IGE)
5	6	7	Quick Stop	T	15*	Quick Stop Deceleration (IGE)
8	9	10	Normal Landing	C	16*	Approach and Landing (IGE)
11	12	13	Low-Speed Flight	T	17	Forward Level Flight, 0.5 VH, 324 RPM
					18	Forward Level Flight, 0.5 VH, 324 RPM
					19	Forward Level Flight, 0.6 VH, 324 RPM
					20	Forward Level Flight, 0.6 VH, 324 RPM
					29	Normal Full Power Climb
					32	Normal Right Turn, 0.5 VH
					35	Normal Left Turn, 0.5 VH
14	15	16	Spare	--	--	
17	18	19	High-Speed Flight	T	21	Forward Level Flight, 0.7 VH, 314 RPM
					22	Forward Level Flight, 0.7 VH, 324 RPM
					23	Forward Level Flight, 0.8 VH, 314 RPM
					24	Forward Level Flight, 0.8 VH, 324 RPM
					25	Forward Level Flight, 0.9 VH, 314 RPM
					26	Forward Level Flight, 0.9 VH, 324 RPM
					42	Part Power Descent
20	21	22	Maximum-Speed Flight	T	27*	Forward Level Flight, VH, 314 RPM
					28*	Forward Level Flight, VH, 324 RPM
23	24	25	High Torque Flight	T	30*	High-Speed Full Power Climbs
					31	Max. Rate Accel. Full Power Climb to Cruise A/S
26	27	28	Normal (Low Speed) Turns	T	33*	Normal Right Turn, 0.5 VH
					36	Normal Left Turn, 0.5 VH
29	30	31	Normal (High Speed) Turns	T	34*	Normal Right Turn, 0.9 VH
					37	Normal Left Turn, 0.9 VH
32	33	34	Medium-Speed Symmetrical Dives	T	46*	Gunnery Run-Pt. Target Dive, 0.8 VI
					50*	Gunnery Run-Spray Fire Dive, 0.8 VI
35	36	37	High-Speed Symmetrical Dives	T	47*	Gunnery Run-Pt. Target Dive, 0.9 VI
					51*	Gunnery Run-Spray Fire Dive, 0.9 VI
38	39	40	Max.-Speed Symmetrical Dives	T	48*	Gunnery Run-Pt. Target Dive, VI
					52*	Gunnery Run-Spray Fire Dive, VI
41	42	43	Medium-Speed Asymmetrical Dives	T	--	
44	45	46	High-Speed Asymmetrical Dives	T	--	
47	48	49	Max.-Speed Asymmetrical Dives	T	--	

NOTE 1: T = Category timer
C = Category occurrence timer
M = Maximum parameter magnitude attained
N = Null recording category (control correction times if applicable) estimated from other category times.

NOTE 2: * Indicates Damaging Flight Condition

TABLE 7. AH-1G FCM SYSTEM SUMMARY (Concluded)

Flt. Cond. Cat. No.			Flight Condition	Type[1]		Flight Conditions Included
L-GW	M-GW	H-GW	Category Description	Desig.	No.[2]	Description
50	51	52	Low-Speed Asymmetrical Pullups	T	53*	Gunnery Run-P/U to the Right, 0.6 VL
					57*	Gunnery Run-P/U to the Left, 0.6 VL
53	54	55	Medium-Speed Asymmetrical Pullups	T	54*	Gunnery Run-P/U to the Right, 0.8 VL
					58*	Gunnery Run-P/U to the Left, 0.8 VL
56	57	58	High-Speed Asymmetrical Pullups	T	55*	Gunnery Run-P/U to the Right, 0.9 VL
					59*	Gunnery Run-P/U to the Left, 0.9 VL
59	60	61	Max.-Speed Asymmetrical Pullups	T	56*	Gunnery Run-P/U to the Right, VL
					60*	Gunnery Run-P/U to the Left, VL
62	63	64	Low-Speed Symmetrical Pullups	T	61*	Gunnery Run-P/U (Symmetrical), 0.6 VL
65	66	67	Medium-Speed Symmetrical Pullups	T	62*	Gunnery Run-P/U (Symmetrical), 0.8 VL
68	69	70	High-Speed Symmetrical Pullups	T	63*	Gunnery Run-P/U (Symmetrical), 0.9 VL
					64*	Gunnery Run-P/U (Symmetrical), VL
71	72	73	Low-Speed Gunnery Turns	T	65*	Gunnery Turn to the Right, 0.5 VH
					68*	Gunnery Turn to the Left, 0.5 VH
74	75	76	Medium-Speed Gunnery Turns	T	66*	Gunnery Turn to the Right, 0.7 VH
					69*	Gunnery Turn to the Left, 0.7 VH
77	78	79	High-Speed Gunnery Turns	T	67*	Gunnery Turn to the Right, 0.9 VH
					70*	Gunnery Turn to the Left, 0.9 VH
80	81	82	Gunnery S-Turn	T	71*	Gunnery S-Turn, 0.8 VH
83	84	85	Maximum-Speed S-Turn	T	72*	Gunnery S-Turn, VH
86	87	88	Autorotation Clock Time	T	73	Power to Auto. Transition, 0.5 VH
					74	Power to Auto. Transition, 0.7 VH
					75	Power to Auto. Transition, 0.9 VH
					76	Auto. to Power Transition (IGE)
					77	Auto. to Power Transition, 0.4 VH
					80	Stabilized Auto. Flight, 0.4 VH
					81	Stabilized Auto. Flight, 0.6 VH
					82	Stabilized Auto. Flight, Max. Auto. A/S
					83	Auto. Turn to the Right, 0.4 VH
					84	Auto. Turn to the Right, 0.6 VH
					86	Auto. Turn to the Left, 0.4 VH
					87	Auto. Turn to the Left, 0.6 VH
89	90	91	Low Nz Auto. to Power Transition	C	78*	Auto. to Power Transition, 0.6 VH
					79*	Auto. to Power Trans., Max. Auto. A/S
92	93	94	High Nz Auto. to Power Transition	C	--	
95	96	97	Low Nz Auto. Turns	T	85*	Auto. Turn to the Right, Max. Auto. A/S
					88*	Auto. Turn to the Left, Max. Auto. A/S
98	99	100	High Nz Auto. Turns	T	--	
101	102	103	Autorotation Landing	C	89*	Autorotation Landing
	104		High Nz Counter	M	--	
	105		Maximum Nz Experienced	M	--	
	106		Maximum Airspeed Experienced	M	--	
	107		Max. Gross Weight Experienced	M	--	
108	109	110	Hovering Control Corrections	N	7*	Hovering Longitudinal Control Corr. (IGE)
					8*	Hovering Lateral Control Corr. (IGE)
					9	Hovering Rudder Control Corr. (IGE)
111	112	113	High Speed Control Corr.	N	38*	Longitudinal Control Corr., 0.9 VH
					39*	Lateral Control Corr., 0.9 VH
					40*	Rudder Control Corr., 0.9 VH

NOTE 1: T = Category timer
C = Category occurrence timer
M = Maximum parameter magnitude attained
N = Null recording category (control correction times are conservatively estimated from other category timers)

NOTE 2: * indicates Damaging Flight Conditions

TABLE 8. AH-1S FCM SYSTEM SUMMARY

Flt. Cond. Cat. No.			Flight Condition Category Description	Type[1] Desig.	Flight Conditions Included	
L-GW	M-GW	H-GW			No.*	Description
1	2		Flight Time	T	-	Takeoff, Normal (IGE)
					3	Takeoff, Jump (IGE)
					13	Sideward Flight to the Right (IGE)
					14	Sideward Flight to the Left (IGE)
					15	Rearward Flight (IGE)
					17	Deceleration, Normal (IGE)
					53	Sideslip to the Right
					56	Strafing in Acceleration from a Hover
	4		Ground Time	T	--	
	5		Rotor Cycles	C	1*	Normal Start/Shutdown (IGE)
	6		Normal Landing	C	19	Approach and Landing (IGE)
	7		Autorotative Landing	C	101*	Auto Landing
8	9	10	Hover, A/S ≤0.3 VH	T	4	Hover, Steady, 294 RPM
					5	Hover, Steady, 304 RPM
					6	Hover, Steady, 314 RPM
					7	Hover, Steady, 324 RPM
					8	Hover, Right Turn
					9	Hover, Left Turn
					55	Firing in a Hover
11	12	13	Cruise, A/S 0.3-0.5 VH	T	28	Fwd Level Flight, 0.5 VH, 314 RPM
					29	Fwd Level Flight, 0.5 VH, 324 RPM
14	15	16	Cruise, A/S 0.5-0.6 VH	T	30	Fwd Level Flight, 0.6 VH, 314 RPM
					31	Fwd Level Flight, 0.6 VH, 324 RPM
17	18	19	Cruise, A/S 0.6-0.7 VH	T	32	Fwd Level Flight, 0.7 VH, 314 RPM
					33	Fwd Level Flight, 0.7 VH, 324 RPM
20	21	22	Cruise, A/S 0.7-0.8 VH	T	34	Fwd Level Flight, 0.8 VH, 314 RPM
					35	Fwd Level Flight, 0.8 VH, 324 RPM
23	24	25	Cruise, A/S 0.8-0.9 VH	T	36*	Fwd Level Flight, 0.9 VH, 314 RPM
					37*	Fwd Level Flight, 0.9 VH, 324 RPM
26	27	28	Cruise, A/S 0.9-1.0 VH	T	38*	Fwd Level Flight, 1.0 VH, 314 RPM
					39*	Fwd Level Flight, 1.0 VH, 324 RPM
29	30	31	Cruise, A/S 1.0-1.1 VH	T	--	
32	33	34	Cruise, A/S >1.1 VH	T	--	
35	36	37	Climb, A/S >0.5 VH	T	40*	Full Power Climb to 70 Knots
					41*	Full Power Climb to 120 Knots
38	39	40	Descent, A/S >0.5 VH	T	54*	Part Power Descent
41	42	43	Acceleration to Climb	T	16	Acceleration, Hover to Climb A/S (IGE)
					42*	Maximum Rate Acceleration Climb to 0.9 VH
44	45	46	Flare	T	--	
47	48	49	Normal Turn, A/S >0.5 VH	T	43	Normal Turn to the Right, 0.5 VH
					46*	Normal Turn to the Left, 0.5 VH
50	51	52	Normal Turn, A/S 0.5-0.7 VH	T	44*	Normal Turn to the Right, 0.7 VH
					47*	Normal Turn to the Left, 0.7 VH
53	54	55	Normal Turn, A/S 0.7-0.9 VH	T	45*	Normal Turn to the Right, 0.9 VH
					48*	Normal Turn to the Left, 0.9 VH
56	57	58	Normal Turn, A/S >0.9 VH	T	--	

Note 1: T = Category Timer
C = Category Occurrence Timer
M = Maximum Parameter Magnitude Attained
N = Null Recording Category (times are conservatively estimated from other category timers)
H = Histogram

Note 2: * Indicates Damaging Flight Condition

TABLE 8. AH-1S FCM SYSTEM SUMMARY (Continued)

Flt. Cond. Cat. No.			Flight Condition Category Description	Type[1] Desig.	Flight Conditions Included	
L-GW	M-GW	H-GW			No.[2]	Description
59	60	61	Gunnery Turn, A/S <0.5 VH	T	77*	Gunnery Turn to the Right, 0.5 VH
					*80**	*Gunnery Turn to the Left, 0.5 VH*
62	63	64	Gunnery Turn, A/S 0.5-0.7 VH	T	78*	Gunnery Turn to the Right, 0.7 VH
					81*	Gunnery Turn to the Left, 0.7 VH
65	66	67	Gunnery Turn, A/S 0.7-0.9 VH	T	79*	Gunnery Turn to the Right 0.9 VH
					82*	Gunnery Turn to the Left, 0.9 VH
68	69	70	Gunnery Turn, A/S >0.9 VH	T	--	
71	72	73	Gunnery S-Turn, A/S <0.5 VH	T	--	
74	75	76	Gunnery S-Turn, A/S 0.5-0.7 VH	T	--	
77	78	79	Gunnery S-Turn, A/S 0.7-0.9 VH	T	83*	Gunnery S-Turn at 0.8 VH
80	81	82	Gunnery S-Turn, A/S >0.9 VH	T	84*	Gunnery S-Turn at VH
83	84	85	Symmetrical Dive	T	57*	Gunnery Run, Pt. Target Dive, 0.6 VL
					58*	Gunnery Run, Pt. Target Dive, 0.8 VL
					59*	Gunnery Run, Pt. Target Dive, 0.9 VL
					60*	Gunnery Run, Pt. Target Dive, 1.0 VL
					61*	Gunnery Run, Spray Fire Dive, 0.6 VL
					62*	Gunnery Run, Spray Fire Dive, 0.8 VL
					63*	Gunnery Run, Spray Fire Dive, 0.9 VL
					64*	Gunnery Run, Spray Fire Dive, 1.0 VL
86	87	88	Asymmetrical Dive	T	--	
89	90	91	Symmetrical Pullup	T	73*	Gunnery Run Pullup, Symmetrical, 0.6 VL
					74*	Gunnery Run Pullup, Symmetrical, 0.8 VL
					75*	Gunnery Run Pullup, Symmetrical, 0.9 VL
					76*	Gunnery Run Pullup, Symmetrical, 1.0 VL
92	93	94	Asymmetrical Pullup	T	65*	Gunnery Run Pullup to the Right, 0.6 VL
					66*	Gunnery Run Pullup to the Right, 0.8 VL
					67*	Gunnery Run Pullup to the Right, 0.9 VL
					68*	Gunnery Run Pullup to the Right, 1.0 VL
					69*	Gunnery Run Pullup to the Left, 0.6 VL
					70*	Gunnery Run Pullup to the Left, 0.8 VL
					71*	Gunnery Run Pullup to the Left, 0.9 VL
					72*	Gunnery Run Pullup to the Left, 1.0 VL
95	96	97	Autorotative Time	T	85	Power to Auto, 0.5 VH
					86	Power to Auto, 0.7 VH
					87*	Power to Auto, 0.9 VH
					88	Auto to Power, IGE
					89	Auto to Power, 0.4 VH
					90*	Auto to Power, 0.6 VH
					91*	Auto to Power, Max. Auto A/S
					92	Auto Stabilized Flight, 0.4 VH
					93	Auto Stabilized Flight, 0.6 VH
					94	Auto Stabilized Flight, Max. Auto A/S
98	99	100	Autorotative Turn, Nz <1.5G	T	95	Auto Turn to the Right, 0.4 VH
					96	Auto Turn to the Right, 0.6 VH
					97	Auto Turn to the Right, Max. Auto A/S
					98	Auto Turn to the Left, 0.4 VH
					99	Auto Turn to the Left, 0.6 VH
					100	Auto Turn to the Left, Max. Auto A/S
101	102	103	Autorotative Turn, Nz >1.5G	T	--	
	104		RPM Peak Value	M	--	
	105		Torque Peak Value	M	--	
	106		VL Peak Value	M	--	

Note 1: *T = Category Timer*
C = Category Occurrence Timer
M = Maximum Parameter Magnitude Attained
N = Null Recording Category (times are conservatively estimated from other category timers)
H = Histogram

Note 2: * Indicates Damaging Flight Condition

TABLE 8. AH-1S FCM SYSTEM SUMMARY (Continued)

Flt. Cond. Cat. No.			Flight Condition Category Description	Type[1] Desig.	No.[2]	Flight Conditions Included Description
L-GW	M-GW	H-GW				
	107		VH Peak Value	M	--	
	108		Density Altitude Peak	M	--	
	109		Vertical Acceleration Peak	M	--	
	110		OAT Maximum Value	M	--	
	111		OAT Minimum Value	M	--	
	112		Gross Weight Peak Value	M	--	
	113		Roll Peak	M	--	
114	115	116	Nz Peaks, 1.1-1.3 G's	C	--	
117	118	119	Nz Peaks, 1.3-1.5 G's	C	--	
120	121	122	Nz Peaks, 1.5-1.7 G's	C	--	
123	124	125	Nz Peaks, >1.7 G's	C	--	
	126		Density Alt. Histogram, <1 K	H	--	
	127		Density Alt. Histogram, 1-2 K	H	--	
	128		Density Alt. Histogram, 2-3 K	H	--	
	129		Density Alt. Histogram, 3-4 K	H	--	
	130		Density Alt. Histogram, 4-5 K	H	--	
	131		Density Alt. Histogram, 5-6 K	H	--	
	132		Density Alt. Histogram, 6-7 K	H	--	
	133		Density Alt. Histogram, 7-8 K	H	--	
	134		Density Alt. Histogram, 8-9 K	H	--	
	135		Density Alt. Histogram, 9-10 K	H	--	
	136		Density Alt. Histogram, >10K	H	--	
	137		RPM Histogram, <314	H	--	
	138		RPM Histogram, 314-319	H	--	
	139		RPM Histogram, 319-324	H	--	
	140		RPM Histogram, 324-329	H	--	
	141		RPM Histogram, 329-334	H	--	
	142		RPM Histogram, 334-339	H	--	
	143		RPM Histogram, >339	H	--	
	144		Torque Histogram, <10 psi	H	--	
	145		Torque Histogram, 10-20 psi	H	--	
	146		Torque Histogram, 20-30 psi	H	--	
	147		Torque Histogram, 30-40 psi	H	--	
	148		Torque Histogram, 40-50 psi	H	--	
	149		Torque Histogram, >50 psi	H	--	

Note 1: T = Category Timer
C = Category Occurrence Timer
M = Maximum Parameter Magnitude Attained
N = Null Recording Category (times are conservatively estimated from other category timers)
H = Histogram

Note 2: * Indicates Damaging Flight Condition

TABLE 8. AH-1S FCM SYSTEM SUMMARY (Concluded)

Flt. Cond. Cat. No. L-GW	M-GW	H-GW	Flight Condition Category Description			Type[1] Desig.	No.[2]	Flight Conditions Included Description
			Tri-Variant Table Rudder(%)	A/S(VH)	Torque(psi)			
150			0-10	<0.5	<10	H	--	
151			0-10	<0.5	10-20	H	--	
152			0-10	<0.5	20-30	H	--	
153			0-10	<0.5	30-40	H	--	
154			0-10	<0.5	40-50	H	--	
155			0-10	<0.5	>50	H	--	
156-161			0-10	0.5-0.7	(6)	H	--	
162-167			0-10	0.7-0.9	(6)	H	--	
168-173			0-10	>0.9	(6)	H	--	
174-197			10-20	(4)	(6)	H	--	
198-221			20-40	(4)	(6)	H	--	
222-245			40-60	(4)	(6)	H	--	
246-269			60-80	(4)	(6)	H	--	
270-293			80-90	(4)	(6)	H	--	
294-317			>90	(4)	(6)	H	--	
318	319	320	Hovering Control Corrections			N	10*	Hovering Control Corrections, Longitudinal
							11*	Hovering Control Corrections, Lateral
							12	Hovering Control Corrections, Rudder
321	322	323	High-Speed Control Corrections			N	49*	0.9 VH Control Corrections, Longitudinal
							50*	0.9 VH Control Corrections, Lateral
							51*	0.9 VH Control Corrections, Rudder
324	325	326	Quick Stop and Sideslip			N	18*	Deceleration, Quick Stop
							52*	Sideslip to the Left
327	328	329	Hovering Tow Maneuvers			N	20	Pop-up from Hover
							21	Hover, OGE
							22*	Lateral Accel.& Rev., 50 K R/L
							23*	Lateral Accel. & Rev., 50 K L/R
							24	Abrupt Descent to Hover (IGE)
330	331	332	Transient Tow Maneuvers			N	25	90° Getaway from Hover, OGE, Right
							26	90° Getaway from Hover, OGE, Left
							27*	Rapid Deceleration to Hover, OGE

Note 1: T = Category Timer
C = Category Occurrence Timer
M = Maximum Parameter Magnitude Attained
N = Null Recording Category (times are conservatively estimated from other category timers)
H = Histogram

Note 2: * Indicates Damaging Flight Condition

blade; therefore, it was grouped with quick stop which is also damaging to only the main rotor blade and none of the other nine components incorporated in the FCM system.

Conservatism is maintained in this grouping in two ways: (1) The damage rate used for the flight condition categories is always the larger of the two flight condition damage rates. (2) The estimated time for the flight condition categories was liberally estimated at 15 percent of the difference between the total recorded flight time and the amount of time spent doing all of the other directly recorded maneuvers.

The tow maneuvers that were added to the AH-1S spectrum also cannot be reliably detected with FCM system parameters. To facilitate the estimation of time for these maneuvers, two flight condition category groups were created. These groups are titled "Hovering Tow Maneuvers" and "Transient Tow Maneuvers". These groupings are beneficial in that the time spent doing the flight conditions grouped under Hovering Tow Maneuvers will be recorded in flight condition categories 8, 9, and 10 while the flight conditions grouped under Transient Tow Maneuvers will be recorded in flight condition categories 1, 2, and 3. Correspondingly, a liberal percentage of time was deducted from these flight condition categories and assigned to FCC nos. 327-332. Twenty percent of the time recorded in the Hovering flight condition categories was assigned to the Hovering Tow Maneuvers categories and 15 percent of the difference between total flight time and all of the other maneuver times was assigned to the Transient Tow Maneuvers categories.

DAMAGE RATE COEFFICIENTS

The damage rate coefficients used in the FCM system are derived by combining the manufacturer's fatigue substantiation data for each of the components with the FCM system definition. First, on a component-by-component basis, the damage rate for each flight condition in the design utilization spectrum is

calculated by dividing the damage fraction by the percent time of the flight condition in the spectrum. Then, according to the groupings of flight conditions into flight condition categories, the highest damage rate associated with all of the flight conditions within the group is assigned to the overall flight condition category.

An in-house computer program, FCMMOD, was written to perform these calculations for each of the 10 components. A listing of the results of running FCMMOD is provided in Table 9; it represents the final damage rates used for each of the 332 flight condition categories for each of the 10 components. All non-damaging flight condition categories have a corresponding zero damage rate coefficient. Since the majority of the flight condition categories are associated with monitoring nonfatigue-related usage information as mentioned previously, most of the coefficients are zero. Also, since the tail rotor blade on the AH-1S now has an infinite fatigue life, all entries in its table are zero.

DETERMINATION OF FCM SYSTEM TECHNICAL ACCEPTABILITY

To test the resulting FCM system, 100 hours of the design utilization spectrum were converted to 100 hours of equivalent simulated recorder output data. These data were run through the FDAS software and the results are listed in Table 10.

As can be seen from Table 10, a new feature has been added to the AH-1S FDAS program. For each of the 10 components, a table of incremental fatigue damage by flight condition category has been added. These tables will be beneficial in determining which flight condition categories are contributing the most damage to the components based upon the actual aircraft usage.

TABLE 9. FINAL DAMAGE RATE COEFFICIENTS FOR MH-1S FDAS
BY FLIGHT CONDITION
MAIN ROTOR BLADE

	1	2	3	4	5	6	7	8
1	0.0000000	0.0000000	0.0000000	0.0000000	0.0145380	0.0000000	0.0038533	0.000
9	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.
17	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.00
25	0.0005707	0.0003500	0.0028650	0.0037250	0.0011950	0.0032240	0.0048433	0.
33	0.0032240	0.0048433	0.0013025	0.0053000	0.0020000	0.0000000	0.0003133	0.
41	0.0000000	0.0001629	0.0000214	0.0000000	0.0000000	0.0000000	0.000	
49	0.0002067	0.0000000	0.0007980	0.0006400	0.0000000	0.0002370	0.0043583	0.
57	0.0002370	0.0043583	0.0000000	0.0002400	0.0001687	0.0004000	0.0010880	0.
65	0.0006067	0.0032560	0.0042533	0.0006067	0.0032560	0.0042533	0.0000000	
73	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0003800	0.0006333	
81	0.0077333	0.0069333	0.0052500	0.0032500	0.0045930	0.0256417	0.0045000	0.
89	0.0100000	0.0600000	0.1833333	0.0126000	0.0044250	0.0143750	0.0000000	
97	0.0034667	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	
105	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	
113	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	
121	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	
129	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	
137	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	
145	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	
153	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	
161	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	
169	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	
177	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
185	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
193	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
201	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
209	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
217	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
225	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
233	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
241	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
249	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
257	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
265	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
273	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
281	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
289	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
297	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
305	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
313	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0096000	0.0000000
321	0.0002000	0.0077200	0.0148667	0.0000000	0.0005533	0.0003400	0.0000000	0.003
329	0.0008800	0.0000000	0.0000080	0.0016720				

TABLE 9. FINAL DAMAGE RATE COEFFICIENTS FOR AH-1S FDAS
BY FLIGHT CONDITION (Continued)
MAIN ROTOR YOKE EXTENSION

	1	2	3	4	5	6	7	8
1	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
9	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
17	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
25	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
33	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
41	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
49	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
57	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
65	0.0000000	0.0000000	0.0029689	0.0000000	0.0000000	0.0029689	0.0000000	0.0000000
73	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
81	0.0000000	0.0079111	0.0000000	0.0000000	0.0047430	0.0000000	0.0000000	0.0394833
89	0.0075010	0.0560000	0.2383333	0.0255833	0.0262750	0.0386110	0.0000000	0.0000000
97	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
105	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
113	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
121	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
129	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
137	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
145	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
153	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
161	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
169	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
177	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
185	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
193	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
201	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
209	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
217	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
225	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
233	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
241	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
249	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
257	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
265	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
273	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
281	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
289	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
297	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
305	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
313	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
321	0.0000000	0.0283200	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
329	0.0000000	0.0000000	0.0000000	0.0000000				

TABLE 9. FINAL DAMAGE RATE COEFFICIENTS FOR AH-1S EDAS
BY FLIGHT CONDITION (Continued)
MAIN ROTOR GRIP

	1	2	3	4	5	6	7	8
1	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
9	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
17	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
25	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
33	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
41	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
49	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
57	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
65	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
73	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
81	0.0000000	0.0000000	0.0000000	0.0000000	0.0005050	0.0000000	0.0000000	0.0040278
89	0.0000000	0.0000000	0.0383333	0.0000000	0.0000000	0.0422222	0.0000000	0.0000000
97	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
105	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
113	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
121	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
129	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
137	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
145	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
153	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
161	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
169	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
177	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
185	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
193	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
201	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
209	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
217	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
225	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
233	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
241	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
249	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
257	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
265	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
273	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
281	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
289	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
297	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
305	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
313	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
321	0.0000000	0.0062000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
329	0.0000000	0.0000000	0.0000000	0.0000000				

TABLE 9. FINAL DAMAGE RATE COEFFICIENTS FOR AH-1S FDAS BY FLIGHT CONDITION (Continued)
MAIN ROTOR PITCH HORN

	1	2	3	4	5	6	7	8
1	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
9	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
17	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
25	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
33	0.0000000	0.0000000	0.0004700	0.0002440	0.0000000	0.0000000	0.0000000	0.0000000
41	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
49	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0003783	0.0000000
57	0.0000000	0.0003383	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
65	0.0003467	0.0013600	0.0010578	0.0003467	0.0013600	0.0010578	0.0000000	0.0000000
73	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
81	0.0040800	0.0009333	0.0006250	0.0007500	0.0053778	0.0006250	0.0007500	0.0053778
89	0.0050000	0.0630000	0.1456667	0.0150000	0.0630000	0.1456667	0.0000000	0.0000000
97	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
105	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
113	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
121	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
129	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
137	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
145	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
153	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
161	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
169	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
177	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
185	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
193	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
201	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
209	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
217	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
225	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
233	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
241	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
249	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
257	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
265	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
273	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
281	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
289	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
297	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
305	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
313	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
321	0.0000000	0.0019600	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
329	0.0000000	0.0000000	0.0000000	0.0000000				

TABLE 9. FINAL DAMAGE RATE COEFFICIENTS FOR AH-1S FDAS BY FLIGHT CONDITION (Continued)
RETENTION STRAP FTG/NUT

	1	2	3	4	5	6	7	8
1	0.0000000	0.0000000	0.0000000	0.0000000	0.0322390	0.0000000	0.0000000	0.0000000
9	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
17	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
25	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
33	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
41	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
49	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
57	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
65	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
73	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
81	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
89	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
97	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
105	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
113	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
121	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
129	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
137	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
145	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
153	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
161	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
169	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
177	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
185	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
193	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
201	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
209	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
217	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
225	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
233	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
241	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
249	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
257	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
265	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
273	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
281	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
289	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
297	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
305	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
313	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
321	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
329	0.0000000	0.0000000	0.0000000	0.0000000				

TABLE 9. FINAL DAMAGE RATE COEFFICIENTS FOR MI-IS FDAS BY FLIGHT CONDITION (Continued)
SWASHPLATE DRIVE LINK

	1	2	3	4	5	6	7	8
1	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
9	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
17	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
25	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
33	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
41	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
49	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
57	0.0000000	0.0000200	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
65	0.0000000	0.0003280	0.0002844	0.0000000	0.0003280	0.0002844	0.0000000	0.0000000
73	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
81	0.0008800	0.0000000	0.0000000	0.0000000	0.0012500	0.0000000	0.0000000	0.0012500
89	0.0008333	0.0250000	0.0640000	0.0051667	0.0077000	0.0192260	0.0066000	0.0000000
97	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
105	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
113	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
121	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
129	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
137	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
145	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
153	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
161	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
169	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
177	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
185	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
193	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
201	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
209	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
217	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
225	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
233	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
241	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
249	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
257	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
265	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
273	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
281	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
289	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
297	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
305	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
313	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
321	0.0000000	0.0003200	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
329	0.0000000	0.0000000	0.0000000	0.0000000				

TABLE 9. FINAL DAMAGE RATE COEFFICIENTS FOR MH-1S FDAS BY FLIGHT CONDITION (Continued)
SWASHPLATE OUTER RING

	1	2	3	4	5	6	7	8
1	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
9	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
17	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
25	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
33	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
41	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
49	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
57	0.0000000	0.0000450	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
65	0.0000000	0.0051300	0.0050360	0.0000000	0.0031023	0.0062467	0.0000000	0.0000000
73	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
81	0.0006133	0.0000000	0.0000000	0.0000000	0.0042540	0.0000000	0.0000000	0.0340278
89	0.0300000	0.0878500	0.1807240	0.0059580	0.0477000	0.0643330	0.0000000	0.0000000
97	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
105	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
113	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
121	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
129	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
137	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
145	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
153	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
161	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
169	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
177	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
185	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
193	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
201	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
209	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
217	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
225	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
233	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
241	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
249	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
257	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
265	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
273	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
281	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
289	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
297	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
305	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
313	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
321	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
329	0.0000000	0.0000000	0.0000000	0.0000000				

TABLE 9. FINAL DAMAGE RATE COEFFICIENTS FOR AH-1S FDAS BY FLIGHT CONDITION (Continued)
SWASHPLATE INNER RING

	1	2	3	4	5	6	7	8
1	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
9	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
17	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
25	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
33	0.0000000	0.0000000	0.0003362	0.0007980	0.0000000	0.0000000	0.0000000	0.0000000
41	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
49	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0008050	0.0000000
57	0.0000000	0.0008050	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
65	0.0017333	0.0016107	0.0007778	0.0017333	0.0016107	0.0007778	0.0000000	0.0000000
73	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
81	0.0110667	0.0083111	0.0073370	0.0050000	0.0093210	0.0098214	0.0050000	0.0165778
89	0.0133333	0.1010000	0.2333333	0.0325000	0.0092600	0.0334670	0.0000000	0.0000000
97	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
105	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
113	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
121	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
129	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
137	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
145	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
153	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
161	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
169	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
177	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
185	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
193	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
201	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
209	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
217	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
225	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
233	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
241	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
249	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
257	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
265	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
273	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
281	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
289	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
297	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
305	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
313	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
321	0.0000000	0.0015200	0.0007333	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
329	0.0000000	0.0000000	0.0000000	0.0000000				

TABLE 9. FINAL DAMAGE RATE COEFFICIENTS FOR AH-1S FDAS BY FLIGHT CONDITION (Continued)
HYDRAULIC BOOST CYLINDER

	1	2	3	4	5	6	7	8
1	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
9	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
17	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
25	0.0000000	0.0000000	0.0001780	0.0000000	0.0000000	0.0008900	0.0000000	0.0000000
33	0.0008900	0.0000000	0.0013363	0.0003810	0.0000000	0.0000000	0.0000000	0.0000000
41	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
49	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
57	0.0000000	0.0004000	0.0000000	0.0000000	0.0016622	0.0000000	0.0000000	0.0000000
65	0.0003067	0.0024050	0.0021687	0.0003067	0.0042567	0.0021689	0.0000000	0.0000000
73	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
81	0.0021067	0.0218567	0.0104360	0.0023630	0.0034430	0.0508333	0.0141333	0.0011444
89	0.0333333	0.1162000	0.3150000	0.0302500	0.0200000	0.0497220	0.0000000	0.0000000
97	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
105	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
113	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
121	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
129	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
137	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
145	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
153	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
161	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
169	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
177	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
185	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
193	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
201	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
209	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
217	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
225	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
233	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
241	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
249	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
257	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
265	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
273	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
281	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
289	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
297	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
305	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
313	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
321	0.0000000	0.0055600	0.0032667	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
329	0.0000000	0.0000000	0.0000000	0.0000000				

TABLE 9. FINAL DAMAGE RATE COEFFICIENTS FOR MI-1S FDS
BY FLIGHT CONDITION (Concluded)
TAIL ROTOR BLADE

	1	2	3	4	5	6	7	8
1	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
9	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
17	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
25	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
33	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
41	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
49	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
57	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
65	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
73	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
81	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
89	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
97	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
105	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
113	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
121	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
129	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
137	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
145	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
153	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
161	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
169	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
177	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
185	0.0000000	0.0000000	[illegible]	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
193	0.0000000	0.0000000	[illegible]	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
201	0.0000000	0.0000000	[illegible]	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
209	0.0000000	0.0000000	[illegible]	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
217	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
225	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
233	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
241	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
249	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
257	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
265	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
273	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
281	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
289	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
297	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
305	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
313	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
321	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
329	0.0000000	0.0000000	0.0000000	0.0000000				

TABLE 10. VALIDATION OF FDAS MODEL WITH AH-1S DESIGN SPECTRUM

SIKS SPECTRUM USAGE

AIRCRAFT: 76-22580 LOG TIME: 100.0 RETRIEVAL DATE: 6/ 1/82 REASON: COMPONENT REPLACEMENT
RECORDER: 1099 BASE: 1
DELTA LOG TIME: 100.0 HOURS
VALUES PER 100 HOURS WERE COMPUTED USING THE RETRIEVAL TIME.
******* INDICATES AN INVALID FLIGHT CONDITION VALUE

FLIGHT CONDITION	GROSS WEIGHT (LB)	TIME (HOURS) RETRIEVAL	TIME (HOURS) PER 100 HOURS	OCCURRENCE RETRIEVAL	OCCURRENCE PER 100 HOURS
FLIGHT TIME	TOTAL	100.0	100.0		
1	<7750	20.0	20.0		
2	7750-8750	50.0	50.0		
3	>8750	30.0	30.0		
GROUND TIME	TOTAL	10.0	10.0		
4		10.0	10.0		
ROTOR CYCLES	TOTAL			400	400
5				400	400
NORMAL LANDINGS	TOTAL			180	180
6				180	180
AUTOROTATIVE LANDINGS	TOTAL			60	60
7				60	60
HOVER A/S <.3 VH	TOTAL	6.5	6.5		
8	<7750	0.5	0.5		
9	7750-8750	3.2	3.2		
10	>8750	2.7	2.7		
CRUISE A/S .3-.5 VH	TOTAL	5.0	5.0		
11	<7750	1.0	1.0		
12	7750-8750	2.5	2.5		
13	>8750	1.5	1.5		
CRUISE A/S .5-.6 VH	TOTAL	2.0	2.0		
14	<7750	0.4	0.4		
15	7750-8750	1.0	1.0		
16	>8750	0.6	0.6		
CRUISE A/S .6-.7 VH	TOTAL	3.0	3.0		
17	<7750	0.6	0.6		
18	7750-8750	1.5	1.5		
19	>8750	0.9	0.9		
CRUISE A/S .7-.8 VH	TOTAL	15.0	15.0		
20	<7750	3.0	3.0		
21	7750-8750	7.5	7.5		
22	>8750	4.5	4.5		
CRUISE A/S .8-.9 VH	TOTAL	25.0	25.0		
23	<7750	5.0	5.0		
24	7750-8750	12.5	12.5		
25	>8750	7.5	7.5		
CRUISE A/S .9-1.0 VH	TOTAL	10.0	10.0		
26	<7750	2.0	2.0		
27	7750-8750	5.0	5.0		
28	>8750	3.0	3.0		

TABLE 10. VALIDATION OF FDAS MODEL WITH AH-1S DESIGN SPECTRUM (Continued)

SIKS SPECTRUM USAGE

AIRCRAFT: 76-22580 LOG TIME: 100.0 RETRIEVAL DATE: 07 1/82 REASON: COMPONENT REPLACEMENT
RECORDER: 1099 BASE: 1
DELTA LOG TIME: 100.0 HOURS
VALUES PER 100 HOURS WERE COMPUTED USING THE RETRIEVAL TIME.
******* INDICATES AN INVALID FLIGHT CONDITION VALUE

FLIGHT CONDITION	GROSS WEIGHT (LB)	TIME (HOURS) RETRIEVAL	TIME (HOURS) PER 100 HOURS	OCCURRENCE RETRIEVAL	OCCURRENCE PER 100 HOURS
CRUISE A/S 1.0-1.1 VH	TOTAL	0.0	0.0		
29	<7750	0.0	0.0		
30	7750-8750	0.0	0.0		
31	>8750	0.0	0.0		
CRUISE A/S > 1.1 VH	TOTAL	0.0	0.0		
32	<7750	0.0	0.0		
33	7750-8750	0.0	0.0		
34	>8750	0.0	0.0		
CLIMB A/S >.5 VH	TOTAL	5.0	5.0		
35	<7750	1.0	1.0		
36	7750-8750	2.5	2.5		
37	>8750	1.5	1.5		
DESCENT A/S >.5 VH	TOTAL	2.5	2.5		
38	<7750	0.5	0.5		
39	7750-8750	1.3	1.3		
40	>8750	0.8	0.8		
ACCELERATION TO CLIMB	TOTAL	3.3	3.3		
41	<7750	0.7	0.7		
42	7750-8750	1.6	1.6		
43	>8750	1.0	1.0		
FLARE	TOTAL			0	0
44	<7750			0	0
45	7750-8750			0	0
46	>8750			0	0
NORMAL TURNS A/S .5 VH	TOTAL	2.0	2.0		
47	<7750	0.4	0.4		
48	7750-8750	1.0	1.0		
49	>8750	0.6	0.6		
NORMAL TURNS A/S .5-.7 VH	TOTAL	2.0	2.0		
50	<7750	0.4	0.4		
51	7750-8750	1.0	1.0		
52	>8750	0.6	0.6		
NORMAL TURNS A/S .7-.9 VH	TOTAL	4.0	4.0		
53	<7750	0.8	0.8		
54	7750-8750	2.0	2.0		
55	>8750	1.2	1.2		
NORMAL TURNS A/S >.9 VH	TOTAL	0.0	0.0		
56	<7750	0.0	0.0		
57	7750-8750	0.0	0.0		
58	>8750	0.0	0.0		

TABLE 10. VALIDATION OF FDAS MODEL WITH AH-1S DESIGN SPECTRUM (Continued)

SIRS SPECTRUM USAGE

AIRCRAFT: 78-22580 LOG TIME: 100.0 RETRIEVAL DATE: 6/ 1/82 REASON: COMPONENT REPLACEMENT
RECORDER: 1099 BASE: 1
DELTA LOG TIME: 100.0 HOURS
VALUES PER 100 HOURS WERE COMPUTED USING THE RETRIEVAL TIME.
******* INDICATES AN INVALID FLIGHT CONDITION VALUE

FLIGHT CONDITION	GROSS WEIGHT (LB)	TIME (HOURS) RETRIEVAL	TIME (HOURS) PER 100 HOURS	OCCURRENCE RETRIEVAL	OCCURRENCE PER 100 HOURS
GUNNERY TURN A/S .5 VH	TOTAL	0.8	0.8		
59	7750	0.2	0.2		
60	7750-8750	0.4	0.4		
61	8750	0.2	0.2		
GUNNERY TURN A/S .5 .7 VH	TOTAL	0.8	0.8		
62	7750	0.2	0.2		
63	7750 8750	0.4	0.4		
64	8750	0.2	0.2		
GUNNERY TURN A/S .7 .9 VH	TOTAL	1.5	1.5		
65	7750	0.3	0.3		
66	7750 8750	0.7	0.7		
67	8750	0.4	0.4		
GUNNERY TURN A/S .9 VH	TOTAL	0.0	0.0		
68	7750	0.0	0.0		
69	7750 8750	0.0	0.0		
70	8750	0.0	0.0		
GUN S TURN A/S .5 VH	TOTAL	0.0	0.0		
71	7750	0.0	0.0		
72	7750 8750	0.0	0.0		
73	8750	0.0	0.0		
GUN S TURN A/S .5 .7 VH	TOTAL	0.0	0.0		
74	7750	0.0	0.0		
75	7750 8750	0.0	0.0		
76	8750	0.0	0.0		
GUN S TURN A/S .7 .9 VH	TOTAL	0.2	0.2		
77	7750	0.0	0.0		
78	7750-8750	0.1	0.1		
79	8750	0.1	0.1		
GUN S TURN A/S .9 VH	TOTAL	0.1	0.1		
80	7750	0.0	0.0		
81	7750 8750	0.0	0.0		
82	8750	0.0	0.0		
SYMMETRICAL DIVE	TOTAL	0.8	0.8		
83	7750	0.2	0.2		
84	7750 8750	0.4	0.4		
85	8750	0.2	0.2		
ASYMMETRICAL DIVE	TOTAL	0.0	0.0		
86	7750	0.0	0.0		
87	7750 8750	0.0	0.0		
88	8750	0.0	0.0		

TABLE 10. VALIDATION OF FDAS MODEL WITH AH-1S DESIGN SPECTRUM (Continued)

SIOUX SPECTRUM USAGE

AIRCRAFT: 76-22580 LOG TIME: 100.0 RETRIEVAL DATE: [illegible]
RECORDER: 1099 BASE: 1
DELTA LOG TIME: 100.0 HOURS
VALUES PER 100 HOURS WERE COMPUTED USING THE RETRIEVAL TIME.
******* INDICATES AN INVALID FLIGHT CONDITION VALUE

FLIGHT CONDITION	GROSS WEIGHT (LBS)	TIME EXCEEDANCE RETRIEVAL PER 100 HOURS	OCCURRENCE RETRIEVAL PER [illegible] HOURS
SYMMETRICAL PULLUP	TOTAL	0.0	0.0
89	7750	0.0	0.0
90	7750-8750	0.0	0
91	8750	0.0	0
ASYMMETRICAL PULLUP	TOTAL	0.0	0.0
92	7750	0.0	0.0
93	7750-8750	0.0	0.0
94	8750	0.0	0.0
AUTOROTATIVE TIME	TOTAL	0.0	0.0
95	7750	0.0	0.0
96	7750-8750	0.0	0.0
97	8750	0.0	0
AUTOROTATIVE [illegible]	TOTAL	0.0	0.0
98	[illegible]	0	0.0
99	[illegible]	0	0.0
100	8750	0.0	0.0
AUTOROTATIVE [illegible]	TOTAL	0.0	0.0
101	[illegible]	0.0	0.0
102	[illegible]	0.0	0.0
103	8750	0.0	0

104	[illegible]	0.0
105	TORQUE PEAK VALUE	4.0
106	VL PEAK VALUE	0.0
107	VH PEAK VALUE	0.0
108	[illegible]	0
109	VERTICAL ACCELERATION PEAK	0.0
110	OAT MAXIMUM VALUE	0.0
111	OAT MINIMUM VALUE	0.0
112	GROSS WEIGHT [illegible] VALUE	0.0
113	ROLL PEAK	0.0

TABLE 10. VALIDATION OF FDAS MODEL WITH AH-1S DESIGN SPECTRUM (Continued)

SIRS SPECTRUM USAGE

AIRCRAFT: 76-22580 LOG TIME: 100.0 RETRIEVAL DATE: 82 1/82 REASON: COMPONENT REPLACEMENT
RECORDER: 1099 BASE: 1
DELTA LOG TIME: 100.0 HOURS
VALUES PER 100 HOURS WERE COMPUTED USING THE RETRIEVAL TIME.
******* INDICATES AN INVALID FLIGHT CONDITION VALUE

FLIGHT CONDITION	GROSS WEIGHT (LBS)	TIME (HOURS) RETRIEVAL	TIME (HOURS) PER 100 HOURS	OCCURRENCE RETRIEVAL	OCCURRENCE PER 100 HOURS
NZ PEAKS 1.1 1.3 G	TOTAL			10135	10135
114	7250			2250	2250
115	7250 8750			4010	4010
116	8750			3875	3875
NZ PEAKS 1.3 1.5 G	TOTAL			3544	3544
117	7250			1250	1250
118	7250 8750			1275	1275
119	8750			1019	1019
NZ PEAKS 1.5 1.7 G	TOTAL			168	168
120	7250			47	47
121	7250 8750			69	69
122	8750			52	52
NZ PEAKS 1.7 G	TOTAL			0	0
123	7250			0	0
124	7250 8750			0	0
125	8750			0	0

TABLE 10. VALIDATION OF FDAS MODEL WITH AH-1S DESIGN SPECTRUM (Continued)

SIRS SPECTRUM USAGE

AIRCRAFT: [illegible] TIME: 100.0 RETRIEVAL DATE: 6/ 1/80 REASON: CONFIDENCE ASSESSMENT
RECORDS [illegible] CODE: 1
DELTA LOG TIME: 100.0 HOURS
VALUES PER 100 HOURS WERE COMPUTED USING THE RETRIEVAL TIME.
******** INDICATES [illegible] EXCEEDANCE VALUE

DENSITY ALTITUDE HISTOGRAM
ALTITUDE (X FT)

	1	2	3	4	5	6	7	8	9	10	TOTAL
RETRIEVAL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.0	0.0	0.0	100.0
PER 100 HR	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.0	0.0	0.0	100.0
FLT TIME HRS	[illegible]	[illegible]	128	132	137	142	147	153	174	135	136

KEAS HISTOGRAM
KEAS

	314	316	318	320	322	324	326	TOTAL
RETRIEVAL	[illegible]	[illegible]	[illegible]	3.0	4.5	3.0	[illegible]	100.0
PER 100 HRS	[illegible]	[illegible]	[illegible]	3.0	4.0	3.0	0.0	100.0
FLT TIME HRS	137	138	139	140	141	142	142	

[illegible] HISTOGRAM
TORQUE (PSI)

	1	2	3	4	5	TOTAL
RETRIEVAL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	100.0
PER 100 HRS	[illegible]	[illegible]	[illegible]	[illegible]	0.0	100.0
FLT TIME HRS	144	145	146	147	148	149	

TABLE 10. VALIDATION OF FDAS MODEL WITH MI-1S DESIGN SPECTRUM (Continued)

SIRS SPECTRUM USAGE

AIRCRAFT: 76-2250 LOG TIME: 100.0 RETRIEVAL DATE: 82 1122 REASON: COMPONENT REPLACEMENT
RECORDER: 1099 BASE: 1
DELTA LOG TIME: 100.0 HOURS
VALUES PER 100 HOURS WERE COMPUTED USING THE RETRIEVAL TIME.
******* INDICATES AN INVALID FLIGHT CONDITION VALUE

AIRSPEED VS TORQUE BY RUDDER POSITION

RUDDER POSITION: 10%

A/S (VH)	TORQUE (PSI) 10	10	20	30	40	50	TOTAL	FLIGHT CONDITIONS
.5 PER 100 HRS								150-155
.5 PER 100 HRS								156-161
.7 PER 100 HRS								162-167
.9 PER 100 HRS								168 1/3
***=TOTAL PER 100 HRS								

AIRSPEED VS TORQUE BY RUDDER POSITION

RUDDER POSITION: 10 20%

A/S (VH)	TORQUE (PSI) 10	10	20	30	40	50	TOTAL	FLIGHT CONDITIONS
.5 PER 100 HRS								174 1/9
.5 PER 100 HRS								180-185
.7 PER 100 HRS								186-191
.9 PER 100 HRS								192 197
***=TOTAL PER 100 HRS								

TABLE 10. VALIDATION OF FDAS MODEL WITH AH-1S DESIGN SPECTRUM (Continued)

SIKS SPECTRUM USAGE

AIRCRAFT: 76-22580 LOG TIME: 100.0 RETRIEVAL DATE: 87 1702 REASON: COMPONENT REPLACEMENT
RECORDER: 1099 BASE: 1
DELTA LOG TIME: 100.0 HOURS
VALUES PER 100 HOURS WERE COMPUTED USING THE RETRIEVAL TIME.
******* INDICATES AN INVALID FLIGHT CONDITION VALUE

AIRSPEED VS TORQUE BY RUDDER POSITION

RUDDER POSITION: 20 40%

A/S (KH)	10	20	TORQUE (PSI) 30	40	50	TOTAL	FLIGHT CONDITIONS
.5 PER 100 HRS							198-203
.5 PER 100 HRS							204-209
.7 PER 100 HRS							210-215
.9 PER 100 HRS							216-221
****TOTAL PER 100 HRS							

AIRSPEED VS TORQUE BY RUDDER POSITION

RUDDER POSITION: 40 60%

A/S (KH)	10	20	TORQUE (PSI) 30	40	50	TOTAL	FLIGHT CONDITIONS
.5 PER 100 HRS							222-227
.5 PER 100 HRS							228-233
.7 PER 100 HRS							234-239
.9 PER 100 HRS							240-245
****TOTAL PER 100 HRS							

TABLE 10. VALIDATION OF FDAS MODEL WITH AH-1S DESIGN SPECTRUM (Continued)

SIKO SPECTRUM USAGE

AIRCRAFT: 76-22580 LOG TIME: 100.0 RETRIEVAL DATE: 07/20/ REASON: COMPONENT REPLACEMENT
RECORDER: 1099 BASE: 1
DELTA LOG TIME: 100.0 HOURS
VALUES PER 100 HOURS WERE COMPUTED USING THE RETRIEVAL TIME.
******* INDICATES AN INVALID FLIGHT CONDITION VALUE

AIRSPEED VS TORQUE BY RUDDER POSITION

RUDDER POSITION: 60 80%

A/S (VH)	TORQUE (PSI) 10	10	20	30	40	50	TOTAL	FLIGHT CONDITIONS
.5 PER 100 HRS								246 .93
.5 PER 100 HRS								.52 .07
.7 PER 100 HRS								.08 .03
.9 PER 100 HRS								.04 .01
****TOTAL PER 100 HRS								

AIRSPEED VS TORQUE BY RUDDER POSITION

RUDDER POSITION: 80 90%

A/S (VH)	TORQUE (PSI) 10	10	20	30	40	50	TOTAL	FLIGHT CONDITIONS
.5 PER 100 HRS								220 .75
.5 PER 100 HRS								.26 .01
.7 PER 100 HRS								.08 .00
.9 PER 100 HRS								.08 .03
****TOTAL PER 100 HRS								

TABLE 10. VALIDATION OF FDAS MODEL WITH AH-1S DESIGN SPECTRUM (Continued)

SIKS SPECTRUM USAGE

AIRCRAFT: [illegible] TOT TIME: 100.0 RETRIVAL DATE: 82 1202 REASON: COMPONENT REPLACEMENT
RECORDER: 1099 BASE: 1
DELTA TOT TIME: 100.0 HOURS
VALUES PER 100 HOURS WERE COMPUTED USING THE RETRIVAL TIME.
******* INDICATES AN INVALID FLIGHT CONDITION VALUE

AIRSPEED VS TORQUE BY RUDDER POSITION

RUDDER POSITION: 95%

AVG (VH)	TORQUE (PSI) 10	10	20	30	40	50	TOTAL	FLIGHT CONDITIONS
.5 PER 100 HRS								294-299
.5 PER 100 HRS								300-305
.7 PER 100 HRS								306-311
.2 PER 100 HRS								312-317
****TOTAL PER 100 HRS								

TABLE 10. VALIDATION OF FDAS MODEL WITH AH-1S DESIGN SPECTRUM (Continued)

COMPONENT DAMAGE

AIRCRAFT: 76 22580 LOG TIME: 100.0 RETRIEVAL DATE: 07 1781 REASON: COMPONENT REPLACEMENT
RECORDER: 1099 BASE: 1
DELTA LOG TIME: 100.0 HOURS
DELTA RECORDER TIME: 100.0 HOURS
******* INDICATES AN INVALID FLIGHT CONDITION VALUE

COMPONENT	SIRS DAMAGE	FLIGHT HOUR DAMAGE RECORDER	LOG
MAIN ROTOR BLADE	0.07060	0.09091	0.09091
MAIN ROTOR YOKE EXTENSION	0.02794	0.03030	0.03030
MAIN ROTOR GRIP	0.00658	0.01000	0.01000
MAIN ROTOR PITCH HORN	0.01443	0.01515	0.01515
RETENTION STRAP BIG/NUT	0.03624	0.04545	0.04545
SWASHPLATE DRIVE LINK	0.00523	0.00909	0.00909
SWASHPLATE OUTER RING	0.02936	0.03030	0.03030
SWASHPLATE INNER RING	0.02296	0.03030	0.03030
HYDRAULIC BOOST CYLINDER	0.02879	0.03030	0.03030
TAIL ROTOR BLADE	0.00000	0.00000	0.00000

TABLE 10. VALIDATION OF FDAS MODEL WITH AH-1S DESIGN SPECTRUM (Continued)

AIRCRAFT: 76-22580 LOG TIME: 100.0 RETRIEVAL DATE: 07 1782 REASON: COMPONENT REPLACEMENT
RECORDER: 1099 BASE: 1
DELTA LOG TIME: 100.0 HOURS

FLIGHT CONDITION VALUES USED IN THE DAMAGE CALCULATION.
VALUES ARE IN HOURS.
INVALID FLIGHT CONDITIONS HAS BEEN FLAGGED WITH A NEGATIVE SIGN OR ASTERISKS.

TFCC 1- 10	20.0000	50.0000	30.0000	10.0000	1.0000	1.0000	0.2500	0.4951	3.9373	2.7420
TFCC 11- 20	1.0000	2.4996	1.4996	0.4000	1.0000	0.6000	0.6000	1.4996	1.8996	3.0000
TFCC 21- 30	7.4996	4.4996	4.9250	12.4121	7.3871	3.0000	5.0000	3.0000	4.0000	0.0000
TFCC 31- 40	0.0000	0.0000	0.0000	0.0000	1.0000	2.4996	1.4996	0.5000	1.2744	0.2144
TFCC 41- 50	0.6596	1.6498	0.9893	0.0000	0.0000	0.0000	0.4000	1.0000	0.6000	0.4000
TFCC 51- 60	1.0000	0.6000	0.8000	2.0000	1.2000	0.0000	0.0000	0.0000	0.1000	0.2750
TFCC 61- 70	0.2250	0.1500	0.3750	0.2250	0.4000	0.7500	0.4500	0.0000	0.0000	0.0000
TFCC 71- 80	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0400	0.1000	0.0000	0.0100
TFCC 81- 90	0.0375	0.0225	0.1576	0.3940	0.2364	0.0000	0.0000	0.0000	0.0000	0.0000
TFCC 91-100	0.0060	0.0800	0.2000	0.1200	0.0240	0.0600	0.0300	0.0000	0.0000	0.0000
TFCC 101-110	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TFCC 111-120	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TFCC 121-130	0.0000	0.0000	0.0000	0.0000	0.0000	10.0000	20.0000	40.0000	10.0000	0.0000
TFCC 131-140	4.0000	2.0000	0.0000	0.0000	0.0000	0.0000	2.0000	10.0000	30.0000	0.0000
TFCC 141-150	4.0000	3.0000	0.0000	2.0000	21.0000	50.0000	21.5000	5.0000	0.0000	0.0000
TFCC 151-160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TFCC 161-170	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TFCC 171-180	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TFCC 181-190	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TFCC 191-200	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TFCC 201-210	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TFCC 211-220	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TFCC 221-230	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TFCC 231-240	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TFCC 241-250	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TFCC 251-260	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TFCC 261-270	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TFCC 271-280	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TFCC 281-290	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TFCC 291-300	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TFCC 301-310	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TFCC 311-320	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TFCC 321-330	0.0750	0.1875	0.1125	0.3515	0.5788	0.2276	0.0950	0.0475	0.1484	0.2515
TFCC 331-332	0.5788	0.2276								

TABLE 10. VALIDATION OF FDAS MODEL WITH AH-1S DESIGN SPECTRUM (Continued)

COMPONENT DAMAGE

AIRCRAFT: 76 22580 LOG TIME: 100.0 RETRIEVAL DATE: 07 1782 REASON: COMPONENT REPLACEMENT
RECORDER: 1099 BASE: 1
DELTA LOG TIME: 100.0 HOURS
INCREMENTAL DAMAGE TABLE
VALUES ARE FRACTIONAL PORTION OF INCREMENTAL FATIGUE DAMAGE

MAIN ROTOR BLADE

FCC	1- 10	0.00000	0.00000	0.00000	0.00000	0.01454	0.00000	0.00056	0.00000	0.00000	0.00000
FCC	11- 20	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	21- 30	0.00000	0.00000	0.00000	0.00153	0.00421	0.00070	0.01432	0.00118	0.00000	0.00000
FCC	31- 40	0.00000	0.00000	0.00000	0.00000	0.00150	0.00950	0.00300	0.00000	0.00028	0.00000
FCC	41- 50	0.00000	0.00027	0.00002	0.00000	0.00000	0.00000	0.00000	0.00000	0.00011	0.00000
FCC	51- 60	0.00080	0.00040	0.00000	0.00047	0.00523	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	61- 70	0.00004	0.00006	0.00041	0.00022	0.00018	0.00244	0.00191	0.00000	0.00000	0.00000
FCC	71- 80	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00004	0.00003	0.00015
FCC	81- 90	0.00029	0.00016	0.00083	0.00089	0.00109	0.00000	0.00000	0.00000	0.00004	0.00060
FCC	91-100	0.00110	0.00101	0.00088	0.00172	0.00000	0.00007	0.00013	0.00000	0.00000	0.00000
FCC	101-110	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	111-120	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	121 130	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	131-140	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	141-150	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	151-160	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	161 170	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	171 180	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	181-190	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	191-200	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	201-210	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	211-220	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	221-230	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	231 240	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	241-250	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	251 260	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	261-270	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	271-280	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	281-290	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	291 300	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	301-310	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	311-320	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00031	0.00000
FCC	321-330	0.00001	0.00148	0.00190	0.00000	0.00032	0.00008	0.00000	0.00240	0.00048	0.00000
FCC	331 332	0.00000	0.00038								

TABLE 10. VALIDATION OF FDAS MODEL WITH AH-1S DESIGN SPECTRUM (Continued)

COMPONENT DAMAGE

AIRCRAFT: 76-22580 LOG TIME: 100.0 RETRIEVAL DATE: 82/1/82 REASON: COMPONENT REPLACEMENT
RECORDER: 1099 BASE: 1
DELTA LOG TIME: 100.0 HOURS
INCREMENTAL DAMAGE TABLE
VALUES ARE FRACTIONAL PORTION OF INCREMENTAL FATIGUE DAMAGE

MAIN ROTOR YOKE EXTENSION

FCC	1- 10	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	11- 20	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	21- 30	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	31- 40	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	41- 50	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	51- 60	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.0000	0.00000
FCC	61- 70	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00154	0.00000	0.00000	0.00000
FCC	71- 80	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	81- 90	0.00000	0.00018	0.00000	0.00000	0.00117	0.00000	0.00000	0.00001	0.00001	0.00016
FCC	91-100	0.00113	0.00207	0.00574	0.01064	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	101-110	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	111-120	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	121-130	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	131-140	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	141-150	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	151-160	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	161-170	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	171-180	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	181-190	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	191-200	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	201-210	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	211-220	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	221-230	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	231-240	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	241-250	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	251-260	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	261-270	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	271-280	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	281-290	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	291-300	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	301-310	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	311-320	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	321-330	0.00000	0.00531	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	331-332	0.00000	0.00000								

TABLE 10. VALIDATION OF FDAS MODEL WITH AH-1S DESIGN SPECTRUM (Continued)

COMPONENT DAMAGE

AIRCRAFT: 76-22580 LOG TIME: 100.0 RETRIEVAL DATE: 07 1782 REASON: COMPONENT REPLACEMENT
RECORDER: 1099 BASE: 1
DELTA LOG TIME: 100.0 HOURS
INCREMENTAL DAMAGE TABLE
VALUES ARE FRACTIONAL PORTION OF INCREMENTAL FATIGUE DAMAGE

MAIN ROTOR GRIP

FCC	1- 10	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	11 20	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	21 30	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	31- 40	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	41- 50	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	51 60	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	61 70	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	71- 80	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	81- 90	0.00000	0.00000	0.00000	0.00000	0.00012	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	91 100	0.00023	0.00000	0.00000	0.00507	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	101-110	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	111-120	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	121-130	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	131 140	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	141-150	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	151 160	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	161-170	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	171-180	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	181-190	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	191 200	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	201-210	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	211-220	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	221-230	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	231-240	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	241-250	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	251-260	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	261-270	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	271-280	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	281-290	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	291 300	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	301-310	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	311-320	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	321-330	0.00000	0.00116	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	331-332	0.00000	0.00000								

TABLE 10. VALIDATION OF FDAS MODEL WITH AH-1S DESIGN SPECTRUM (Continued)

COMPONENT DAMAGE

AIRCRAFT: 76-22580 LOG TIME: 100.0 RETRIEVAL DATE: 6/ 1/82 REASON: COMPONENT REPLACEMENT
RECORDER: 1099 BASE: 1
DELTA LOG TIME: 100.0 HOURS
INCREMENTAL DAMAGE TABLE
VALUES ARE FRACTIONAL PORTION OF INCREMENTAL FATIGUE DAMAGE

MAIN ROTOR PITCH HORN

FDC	1- 10	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	[illegible]
FDC	11- 20	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	[illegible]
FDC	21- 30	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	[illegible]
FDC	31- 40	0.00000	0.00000	0.00000	0.00000	0.00047	0.00061	0.00000	0.00000	0.00000	[illegible]
FDC	41- 50	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	[illegible]	[illegible]
FDC	51 60	0.00000	0.00000	0.00000	0.00000	0.00041	0.00000	0.00000	0.00000	0.00000	[illegible]
FDC	61- 70	0.00000	0.00000	0.00000	0.00000	0.00011	0.00102	0.00048	0.00000	[illegible]	[illegible]
FDC	71- 80	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00004	0.00000	[illegible]
FDC	81- 90	0.00015	0.00002	0.00010	0.00030	0.00125	0.00000	0.00000	0.00000	[illegible]	[illegible]
FDC	91-100	0.00087	0.00139	0.00256	0.00374	0.00000	0.00000	0.00000	0.00000	[illegible]	[illegible]
FDC	101-110	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	[illegible]	[illegible]
FDC	111 120	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	[illegible]
FDC	121-130	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	[illegible]
FDC	131-140	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	[illegible]
FDC	141-150	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	[illegible]	[illegible]
FDC	151 160	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	[illegible]
FDC	161-170	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	[illegible]	[illegible]
FDC	171-180	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	[illegible]
FDC	181-190	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	[illegible]
FDC	191-200	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	[illegible]	[illegible]
FDC	201-210	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	[illegible]
FDC	211-220	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	[illegible]
FDC	221-230	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	[illegible]
FDC	231 240	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	[illegible]
FDC	241-250	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	[illegible]
FDC	251-260	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	[illegible]
FDC	261-270	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	[illegible]	[illegible]
FDC	271-290	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	[illegible]	[illegible]
FDC	281-290	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	[illegible]
FDC	291-300	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	[illegible]	[illegible]
FDC	301-310	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	[illegible]	[illegible]
FDC	311-320	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	[illegible]
FDC	321-330	0.00000	0.00047	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	[illegible]
FDC	331-332	0.00000	0.00000								

TABLE 10. VALIDATION OF FDAS MODEL WITH MH-1S DESIGN SPECTRUM (Continued)

COMPONENT DAMAGE

AIRCRAFT: 76-22580 LOG TIME: 100.0 RETRIEVAL DATE: 82 [illegible] REASON: COMPONENT REPLACEMENT
RECORDER: 1099 BASE: 1
DELTA LOG TIME: 100.0 HOURS
INCREMENTAL DAMAGE TABLE
VALUES ARE FRACTIONAL PORTION OF INCREMENTAL FATIGUE DAMAGE

RETENTION STRAP FTG/NUT

FCC	1- 10	0.00000	0.00000	0.00000	0.00000	0.03624	0.00000	0.00000	0.00000	[illegible]	[illegible]
FCC	11- 20	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	21- 30	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	31- 40	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	41- 50	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	51- 60	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	61- 70	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	71- 80	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	81- 90	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	91-100	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	101-110	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	111-120	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	121-130	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	131 140	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	141 150	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	151-160	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	161-170	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	171-180	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	181-190	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	191 200	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	201-210	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	211 220	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	221-230	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	231-240	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	241-250	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	251-260	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	261-270	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	271-280	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	281-290	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	291-300	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	301-310	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	311-320	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	321-330	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	331-332	0.00000	0.00000								

TABLE 10. VALIDATION OF FDAS MODEL WITH AH-1S DESIGN SPECTRUM (Continued)

COMPONENT DAMAGE

AIRCRAFT: 76 22580 LOG TIME: 100.0 RETRIEVAL DATE: 02 1282 REASON: COMPONENT REPLACEMENT
RECORDER: 1099 BASE: 1
DELTA LOG TIME: 100.0 HOURS
INCREMENTAL DAMAGE TABLE
VALUES ARE FRACTIONAL PORTION OF INCREMENTAL FATIGUE DAMAGE

SWASHPLATE DRIVE LINK

FCC 1- 10	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 11- 20	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 21- 30	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 31- 40	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 41- 50	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 51- 60	0.00000	0.00000	0.00000	0.00000	0.00007	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 61- 70	0.00000	0.00000	0.00000	0.00000	0.00000	0.00025	0.00013	0.00000	0.00000	0.00000
FCC 71- 80	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 81- 90	0.00003	0.00000	0.00000	0.00000	0.00030	0.00000	0.00000	0.00000	0.00000	0.00025
FCC 91 100	0.00098	0.00041	0.00154	0.00236	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 101-110	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 111 120	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 121-130	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 131 140	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 141-150	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 151-160	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 161-170	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 171 180	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 181-190	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 191 200	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 201-210	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 211 220	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 221-230	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 231 240	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 241-250	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 251-260	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 261-270	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 271 280	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 281-290	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 291-300	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 301-310	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 311 320	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 321-330	0.00000	0.00006	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 331-332	0.00000	0.00000								

TABLE 10. VALIDATION OF FDAS MODEL WITH AH-1S DESIGN SPECTRUM (Continued)

COMPONENT DAMAGE

AIRCRAFT: 76-22580 LOG TIME: 100.0 RETRIEVAL DATE: 07 1782 REASON: COMPONENT REPLACEMENT
RECORDER: 1099 BASE: 1
DELTA LOG TIME: 100.0 HOURS
INCREMENTAL DAMAGE TABLE
VALUES ARE FRACTIONAL PORTION OF INCREMENTAL FATIGUE DAMAGE

SWASHPLATE OUTER RING

FCC	1- 10	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	11- 20	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	21- 30	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	31- 40	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	41- 50	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	51- 60	0.00000	0.00000	0.00000	0.00000	0.00005	0.00000	0.00000	0.00000	0.00000
FCC	61- 70	0.00000	0.00000	0.00000	0.00000	0.00000	0.00384	0.00227	0.00000	0.00000
FCC	71- 80	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	81- 90	0.00002	0.00000	0.00000	0.00000	0.00101	0.00000	0.00006	0.00000	0.00013
FCC	91-100	0.00108	0.00038	0.00254	0.01012	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	101-110	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	111-120	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	121-130	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	131-140	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	141-150	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	151-160	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	161-170	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	171-180	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	181-190	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	191-200	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	201-210	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	211-220	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	221-230	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	231-240	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	241-250	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	251-260	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	261-270	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	271-280	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	281-290	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	291-300	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	301-310	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	311-320	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	321-330	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	331-332	0.00000	0.00000							

TABLE 10. VALIDATION OF FDAS MODEL WITH MI-1S DESIGN SPECTRUM (Continued)

COMPONENT DAMAGE

AIRCRAFT: 76-22580 LOG TIME: 100.0 REMOVAL DATE: [illegible] REASON: COMPONENT REPLACEMENT
RECORDER: 1099 BASE: 1
DELTA LOG TIME: 100.0 HOURS
INCREMENTAL DAMAGE TABLE
VALUES ARE FRACTIONAL PORTION OF INCREMENTAL FATIGUE DAMAGE

SWASHPLATE INNER RING

FCC	1- 10	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	11- 20	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	21- 30	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	31- 40	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	41- 50	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	51- 60	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	61- 70	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	71- 80	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	81- 90	0.00041	0.00019	0.00116	0.00197	0.00037	0.00000	0.00000	0.00000	0.00000	0.00101
FCC	91 100	0.00164	0.00054	0.00135	0.00307	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	101-110	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	111-120	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	121-130	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	131-140	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	141-150	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	151 160	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	161-170	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	171-180	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	181-190	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	191 200	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	201-210	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	211 220	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	221-230	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	231 240	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	241-250	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	251-260	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	261-270	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	271 280	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	281-290	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	291-300	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	301-310	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	311-320	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	321-330	0.00000	0.00008	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	331-332	0.00000	0.00000								

TABLE 10. VALIDATION OF FDAS MODEL WITH AH-1S DESIGN SPECTRUM (Continued)

COMPONENT DAMAGE

AIRCRAFT: 76-22580 LOG TIME: 100.0 RETRIEVAL DATE: 6/ 1/82 REASON: COMPONENT REPLACEMENT
RECORDER: 1099 BASE: 1
DELTA LOG TIME: 100.0 HOURS
INCREMENTAL DAMAGE TABLE
VALUES ARE FRACTIONAL PORTION OF INCREMENTAL FATIGUE DAMAGE

HYDRAULIC BOOST CYLINDER

FCC 1- 10	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 11- 20	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 21- 30	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00087	0.00000	0.00000	0.00000
FCC 31- 40	0.00000	0.00000	0.00000	0.00000	0.00135	0.00095	0.00000	0.00000	0.00000	0.00000
FCC 41- 50	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 51- 60	0.00000	0.00000	0.00000	0.00000	0.0004B	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 61- 70	0.00037	0.00000	0.00000	0.00000	0.00009	0.00180	0.0009E	0.00000	0.00000	0.00000
FCC 71- 80	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 81- 90	0.00008	0.00049	0.00165	0.00113	0.00200	0.00000	0.00000	0.00000	0.00013	0.00116
FCC 91 100	0.00187	0.00242	0.00400	0.00552	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 101-110	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 111-120	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 121-130	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 131-140	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 141-150	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 151-160	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 161-170	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 171 180	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 181-190	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 191 200	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 201-210	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 211 220	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 221-230	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 231 240	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 241-250	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 251 260	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 261-270	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 271-280	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 281-290	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 291-300	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 301-310	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 311 320	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 321-330	0.00000	0.00104	0.00037	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 331-332	0.00000	0.00000								

TABLE [illegible]. VALIDATION OF FDAS MODEL WITH MI-1S DESIGN SPECTRUM (Concluded)

COMPONENT DAMAGE

AIRCRAFT: [illegible] TIME: [illegible] RETRIEVAL DATE: 6/ 1/82 REASON: COMPONENT REPLACEMENT
RECORDER: 1099 BASE: 1
DELTA LOG TIME: 100.0 HOURS
INCREMENTAL DAMAGE TABLE
VALUES ARE FRACTIONAL PORTION OF INCREMENTAL FATIGUE DAMAGE

TAIL ROTOR BLADE

FCC										
FCC	1- 10	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	11- 20	0.00000	[illegible]	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	21 30	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	31 40	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	41- 50	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	51- 60	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	61- 70	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	71- 80	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	81- 90	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	91-100	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	101-110	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	111 120	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	121-130	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	131-140	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	141-150	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	151 160	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	161-170	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	171 180	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	181-190	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	191 200	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	201-210	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	211 220	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	221-230	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	231 240	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	241 250	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	251 260	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	261 270	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	271 280	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	281-290	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	291 300	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	301 310	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	311 320	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	321-330	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	331-332	0.00000	0.00000								

EOJ FDAS PROGRAM

Table 11 presents the FDAS-calculated fatigue damage, the resulting projected life based upon that incremental damage in 100 hours, and the upper and lower bounds discussed previously. Since all fatigue lives fall within the respective bounds, the FCM system satisfies the technical acceptance criteria and is judged to be a valid means for assessing fatigue damage to AH-1S "Mod S" fatigue-critical components.

TABLE 11. TECHNICAL ACCEPTABILITY RESULTS

	FCM System Performance		Fatigue Life Bounds	
Component Identification	Assessed Damage (fraction)	Projected Life (hr)	Lower (hr)	Upper (hr)
Main Rotor Blade	0.09060	1,104	1,100	1,170
Main Rotor Yoke Extension	0.02795	3,580	3,300	[illegible]
Main Rotor Grip	0.00658	15,198	Unlimited	[illegible]
Main Rotor Pitch Horn	0.01445	6,930	6,600	[illegible]
M/P Retention Strap Fitting/Nut	0.03624	2,759	2,200	2,760
Swashplate Drive Link	0.00573	17,452	11,000	[illegible]
Swashplate Outer Ring	0.02936	3,406	3,300	4,465
Swashplate Inner Ring	0.02296	4,355	3,300	9,979
Hydraulic Boost Cylinder	0.02879	3,473	3,300	4,884
Tail Rotor Blade	0.0	0	2,400	Unlimited

REDUCING PREVIOUSLY RECORDED USAGE DATA

Under a previous effort (Reference 1), operational usage data were collected for five AH-1S helicopters at Fort Rucker, Alabama. After some system modifications were made starting in March 1980, data were collected until August 1980. Under the current effort these after-modification data were reduced by the AH-1S FDAS computer program. Appendix A contains a listing of

the EDAS printout for one of the five aircraft. Due to the length of these listings the remaining data were not included.

Table 12 presents the damages calculated for each data retrieval for each aircraft during the period March-August 1980. The table shows individual and total damage fractions for each component. Also, the delta logbook hours, delta recorder flight time hours, and delta recorder ground time hours were added for clarity. The three damage fraction columns are labeled "SIRS", "RECORDER", and "LOG". The damage under the "SIRS" column results from the calculations performed using the recorded flight condition category times and the associated damage rate coefficients. The damage under the "RECORDER" column represents the assumed damage based upon the recorded flight time multiplied by the inverse of the recommended retirement life of the component (i.e., the fractional portion of the retirement life that has been used based upon recorded flight time). The damage under the "LOG" column represents the assumed damage or the fractional portion of the retirement life used based upon the logbook airframe hours.

Table 12 indicates some usage differences between the aircraft. For instance, aircraft 568, 569, 571, and 574 were stationed at Hanchey A.A.F. while aircraft 570 was stationed at CAIRNS Field. The aircraft stationed at Hanchey were involved in pilot training exercises during this time which included practicing autorotative landings. As should be expected, the recorded ground time was much higher on these four aircraft and was a significant portion of the total recorded time.

The significant amount of nondamaging ground time is reflected in the differences between the "RECORDER" and "LOG" damages. The "RECORDER" damage fractions are typically 60-80% of the "LOG" damage fractions. An exception is the total damage entries on aircraft 571. The total "LOG" damages on this air-

TABLE 12. CUMULATIVE FATIGUE DAMAGE

A/C	Date	Δ Log Time	Recorder Flt Time	Recorder Grd Time	Component Damage: Main Rotor Blade SIRS	Main Rotor Blade Recorder	Main Rotor Blade Log	Main Rotor Yoke Extension SIRS	Main Rotor Yoke Extension Recorder	Main Rotor Yoke Extension Log	Main Rotor Grip SIRS	Main Rotor Grip Recorder	Main Rotor Grip Log
568	20 Mar 80	7.0	4.9	2.0	.00489	.00447	.00636	0.0	.00149	.00212	0.0	.00049	.00070
569	22 Apr 80	22.6	15.7	8.2	.01182	.01431	.02055	.00005	.00477	.00685	0.0	.00157	.00226
	21 May 80	37.1	18.4	18.6	.01831	.01670	.03575	0.0	.00557	.01124	0.0	.00184	.00371
	3 Jun 80	31.3	18.0	11.1	.01462	.01640	.02845	0.0	.00547	.00948	0.0	.00180	.00315
	20 Jun 80	7.7	3.2	5.8	.00352	.00287	.00700	.00085	.00096	.00233	0.0	.00032	.00077
	1 Aug 80	44.4	26.0	18.1	.02437	.02364	.04036	.00004	.00788	.01345	0.0	.00260	.00444
	Total	143.1	81.3	59.8	.07264	.07392	.13009	.00092	.02465	.04335	0.0	.00813	.01431
570	25 Apr 80	25.9	19.0	5.4	.00858	.01725	.02355	.00008	.00575	.00785	0.0	.00190	.00259
	4 Jun 80	25.0	20.3	4.4	.01089	.01846	.02273	.00016	.00615	.00758	0.0	.00203	.00250
	20 Jun 80	12.8	9.6	2.3	.00450	.00876	.01164	0.0	.00292	.00388	0.0	.00096	.00128
	30 Jul 80	14.0	12.8	2.4	.00547	.01167	.01273	0.0	.00389	.00424	0.0	.00128	.00140
	Total	77.7	61.7	14.5	.02924	.05614	.07065	.00024	.01871	.02355	0.0	.00617	.00777
571	24 Apr 80	3.6	3.1	0.5	.00220	.00278	.00327	0.0	.00093	.00109	0.0	.00031	.00036
	21 May 80	37.5	24.0	10.7	.02025	.02180	.03409	0.0	.00727	.01136	0.0	.00240	.00375
	3 Jun 80	29.3	17.1	8.7	.01362	.01554	.02664	0.0	.00518	.00888	0.0	.00171	.00293
	20 Jun 80	0.0	17.5	13.2	.01368	.01588	0.0	0.0	.00529	0.0	0.0	.00175	0.0
	Total	70.4	61.7	33.1	.04975	.05600	.06400	0.0	.01867	.02133	0.0	.00617	.00704
574	21 May 80	26.0	14.9	17.2	.01016	.01335	.02364	.00038	.00452	.00788	0.0	.00149	.00260
	3 Jun 80	6.8	4.8	8.3	.00419	.00438	.00618	0.0	.00146	.00206	0.0	.00048	.00068
	20 Jun 80	21.6	10.9	8.8	.00941	.00995	.01964	0.0	.00331	.00655	0.0	.00109	.00216
	30 Jul 80	67.1	21.0	11.4	.01719	.01909	.06100	0.0	.00636	.02033	0.0	.00210	.00671
	Total	121.5	51.6	45.7	.04095	.04695	.11046	.00038	.01565	.05682	0.0	.00516	.01215

TABLE 12. CUMULATIVE FATIGUE DAMAGE (Continued)

A/C	Date	Component Damage: Main Rotor Pitch Horn SIRS	Main Rotor Pitch Horn Recorder	Main Rotor Pitch Horn Log	Retention Strap Ftg/Nut SIRS	Retention Strap Ftg/Nut Recorder	Retention Strap Ftg/Nut Log	Swashplate Drive Link SIRS	Swashplate Drive Link Recorder	Swashplate Drive Link Log	Swashplate Outer Ring SIRS	Swashplate Outer Ring Recorder	Swashplate Outer Ring Log
568	20 Mar 80	.00001	.00075	.00106	.00698	.00224	.00318	0.0	.00045	.00064	0.0	.00149	.00212
569	22 Apr 80	.00003	.00135	.00542	.01368	.00715	.01027	.00001	.00143	.00205	.00001	.00477	.00685
	21 May 80	.00001	.00278	.00562	.02585	.00835	.01686	0.0	.00167	.00337	0.0	.00557	.01124
	3 Jun 80	.00001	.00275	.00474	.01875	.00820	.01423	0.0	.00164	.00285	0.0	.00547	.00948
	20 Jun 80	.00002	.00048	.00117	.00817	.00144	.00350	.00020	.00029	.00070	.00073	.00096	.00233
	1 Aug 80	.00007	.00594	.00675	.03243	.01182	.02018	.00002	.00236	.00404	.00006	.00788	.01345
	Total	.00014	.01131	.02108	.09286	.03696	.06504	.00023	.00739	.01301	.00080	.02465	.04335
570	22 Apr 80	.00019	.00288	.00392	.00888	.00863	.01177	.00004	.00173	.00235	.00016	.00575	.00785
	4 Jun 80	.00011	.00308	.00379	.01567	.00923	.01136	.00005	.00185	.00227	.00028	.00615	.00758
	20 Jun 80	.00005	.00146	.00194	.00317	.00438	.00582	0.0	.00088	.00116	0.0	.00292	.00388
	30 Jul 80	.00005	.00195	.00212	.00544	.00584	.00636	0.0	.00177	.00127	0.0	.00389	.00424
	Total	.00041	.00937	.01177	.03316	.02808	.03531	.00009	.00563	.00705	.00044	.01871	.02355
571	24 Apr 80	.00004	.00046	.00055	.00245	.00139	.00164	0.0	.00028	.00033	0.0	.00093	.00109
	21 May 80	.00005	.00363	.00568	.02346	.01090	.01705	0.0	.00218	.00341	0.0	.00727	.01136
	3 Jun 80	.00038	.00259	.00444	.01468	.00777	.01332	0.0	.00155	.00266	0.0	.00518	.00888
	20 Jun 80	.00002	.00265	0.0	.01549	.00794	0.0	0.0	.00159	0.0	0.0	.00529	0.0
	Total	.00009	.00933	.01067	.05608	.02800	.03201	0.0	.00560	.00640	0.0	.01867	.02133
574	21 May 80	.00042	.00226	.00394	.01252	.00677	.01182	.00016	.00135	.00236	.00059	.00452	.00788
	3 Jun 80	.00001	.00075	.00105	.00498	.00219	.00309	0.0	.00044	.00062	0.0	.00146	.00206
	20 Jun 80	.00001	.00166	.00527	.01325	.00497	.00982	0.0	.00099	.00196	0.0	.00331	.00655
	30 Jul 80	.00005	.00518	.01017	.02084	.00955	.03050	0.0	.00191	.00610	.00002	.00636	.02033
	Total	.00049	.00985	.01841	.05157	.02348	.05523	.00016	.00469	.01104	.00061	.01565	.03682

TABLE 12. CUMULATIVE FATIGUE DAMAGE (Concluded)

A/C	Date	Component Damage								
		Swashplate Inner Ring			Hydraulic Boost Cylinder			Tail Rotor Blade		
		SIRS	Recorder	Log	SIRS	Recorder	Log	SIRS	Recorder	Log
368	20 Mar 80	.00002	.00149	.00212	.00001	.00149	.00212	0.0	0.0	0.0
369	22 Apr 80	.00011	.00477	.00685	.00009	.00477	.00685	0.0	0.0	0.0
	21 May 80	.00005	.00557	.01124	.00003	.00557	.01124	0.0	0.0	0.0
	3 Jun 80	.00002	.00547	.00948	.00001	.00547	.00948	0.0	0.0	0.0
	20 Jun 80	.00079	.00096	.00233	.00090	.00096	.00233	0.0	0.0	0.0
	1 Aug 80	.00015	.00788	.01345	.00015	.00788	.01345	0.0	0.0	0.0
	Total	.00112	.02465	.04335	.00116	.02465	.04335	0.0	0.0	0.0
370	25 Apr 80	.00045	.00575	.00785	.00055	.00575	.00785	0.0	0.0	0.0
	4 Jun 80	.00025	.00615	.00758	.00024	.00615	.00758	0.0	0.0	0.0
	20 Jun 80	.00015	.00292	.00388	.00007	.00292	.00388	0.0	0.0	0.0
	30 Jul 80	.00011	.00389	.00424	.00005	.00389	.00424	0.0	0.0	0.0
	Total	.00096	.01871	.02355	.00071	.01871	.02355	0.0	0.0	0.0
371	24 Apr 80	.00003	.00093	.00109	.00002	.00093	.00109	0.0	0.0	0.0
	21 May 80	.00010	.00727	.01136	.00005	.00727	.01136	0.0	0.0	0.0
	3 Jun 80	.00009	.00518	.00888	.00004	.00518	.00888	0.0	0.0	0.0
	20 Jun 80	.00008	.00529	0.0	.00004	.00529	0.0	0.0	0.0	0.0
	Total	.00030	.01867	.02133	.00015	.01867	.02133	0.0	0.0	0.0
374	21 May 80	.00073	.00452	.00788	.00087	.00452	.00788	0.0	0.0	0.0
	5 Jun 80	.00001	.00146	.00206	.00002	.00146	.00206	0.0	0.0	0.0
	20 Jun 80	.00002	.00331	.00655	.00001	.00331	.00655	0.0	0.0	0.0
	30 Jul 80	.00016	.00636	.02033	.00008	.00636	.02033	0.0	0.0	0.0
	Total	.00093	.01565	.03682	.00098	.01565	.03682	0.0	0.0	0.0

craft are significantly lower than they should be because when the data retrieval was made on 20 June 1980 the logbook hours were entered incorrectly. The result was that the delta log time, and thus the associated "LOG" damage for that period, had to be arbitrarily set to zero. Based upon the data that is provided in Table 12, it is estimated that the delta log time was probably around 30 hours, which would make the associated total "LOG" damages for this aircraft approximately 40% higher than listed. This increase would make the proportional differences between the "RECORDER" and "LOG" damages for this aircraft equivalent to the other three aircraft stationed at Hanchey A.H.P.

In general, the calculated "SIRS" damage is significantly lower than the "RECORDER" and the "LOG" damage, indicating that little time was spent flying the most damaging maneuvers. The most striking example is the data associated with the main rotor grip. Every FDAS-calculated damage entry for this component on every aircraft is zero. The manufacturer's fatigue substantiation report indicates that the only flight conditions that are damaging to this part are:

(1) Longitudinal control corrections at 0.9 VH at medium gross weight

(2) Spray fire dives to VL at high gross weight

(3) Gunnery run pullups to the left at 0.8 VL at high gross weight

(4) Gunnery run pullups to the left at VL at high gross weight

(5) Gunnery run symmetrical pullups at 0.9 VL at high gross weight

(6) Gunnery run symmetrical pullups at VL at high gross weight.

No time was recorded in the flight condition categories to which these flight conditions were assigned. As noted in Reference 1, the gross weight signal was deleted when trouble with the lift link-mounted sensor was detected. Time for all flight condition categories was arbitrarily forced into the medium gross weight categories. Even though most of the flight conditions listed above are for high gross weight, it is certain that they were not flown because no time was recorded in the corresponding medium gross weight flight condition categories.

One component set, the main rotor retention strap fitting and nut, indicates "SIRS" damage greater than the associated "RECORDER" and "LOG" damages. This is true for the four aircraft stationed at Hanchey and nearly true for aircraft 570. The only damaging flight condition category associated with this component set is "rotor cycles." Here again, the higher relative damage accrued by the four aircraft at Hanchey can be attributed to the higher number of rotor cycles that would reasonably be associated with autorotative landings and normal landings that were being practiced. The relatively large damage fractions calculated for the recorded number of rotor cycles can be traced to the manufacturer's fatigue substantiation report. The report assumed, including a factor of safety, that 5.5 rotor start-stop cycles would be performed in 1 hour. For 15,177 cycles to failure, a fatigue life of 2,760 hours was calculated with a recommended retirement life of 2,200 hours. Based upon the aircraft usage and the number of rotor cycles recorded, this estimate of 5.5 rotor cycles/hour may not have been conservative enough; also, the validity of the rotor cycle recording process should be reassessed.

The data in Table 12 indicate the completion of the AH-1S FCM SIRS system. However, it should be considered as reference data only for two reasons. First, a valid distribution of recorded time in the three gross weight ranges was not afforded due to the problems with the gross weight sensor as noted in Reference 1. Second, the AH-1S FDAS program developed under this effort is applicable for the "Mod S" Cobra while the actual usage data was recorded on five production-S aircraft.

DEVELOPMENT OF AN IMPROVED LIFT-LINK-BASED GROSS WEIGHT SENSOR

DESIGN MODIFICATIONS

The lift-link sensor assembly used during past flight tests on AH-1G and AH-1S helicopters did not completely satisfy requirements for reliability and repeatability of lift load data output. Therefore, methods to improve the performance of the sensor attachment design were investigated. The improved design is shown in Figure 1.

In order to meet the requirement not to affect the structural integrity of the lift-link, steel bearing plates on to which the sensor brackets are mounted were epoxy-bonded to the surface. The sensor support brackets are clamped to the bearing plates and in addition secured by setscrews. The weight of the brackets has been reduced to minimize the effect of dynamic loads on the attachment mechanism.

In selecting the best sensing device for the lift link, consideration was given to wire-type strain gages, inductive displacement measuring devices such as linear variable differential transformers, and piezoelectric sensors. The determining factors for selecting a piezoresistive-type transducer were a combination of high signal output, good fatigue life, and ease of installation. In addition, previous experience with this type of sensor was satisfactory, provided that the attachment method to the lift link could be improved.

The sensor selected is of the piezoresistive type (Kistler Morse DMC-6FF4-110). Its principal characteristics are an output of 1000 mV at an excitation voltage of 10V and a maximum allowable deflection of $\pm$.015 inch. Linearity, repeatability, and hysteresis are within 0.05 percent of rated output. The fatigue life of the sensor is greater than one million cycles at $\pm$ full scale deflection.

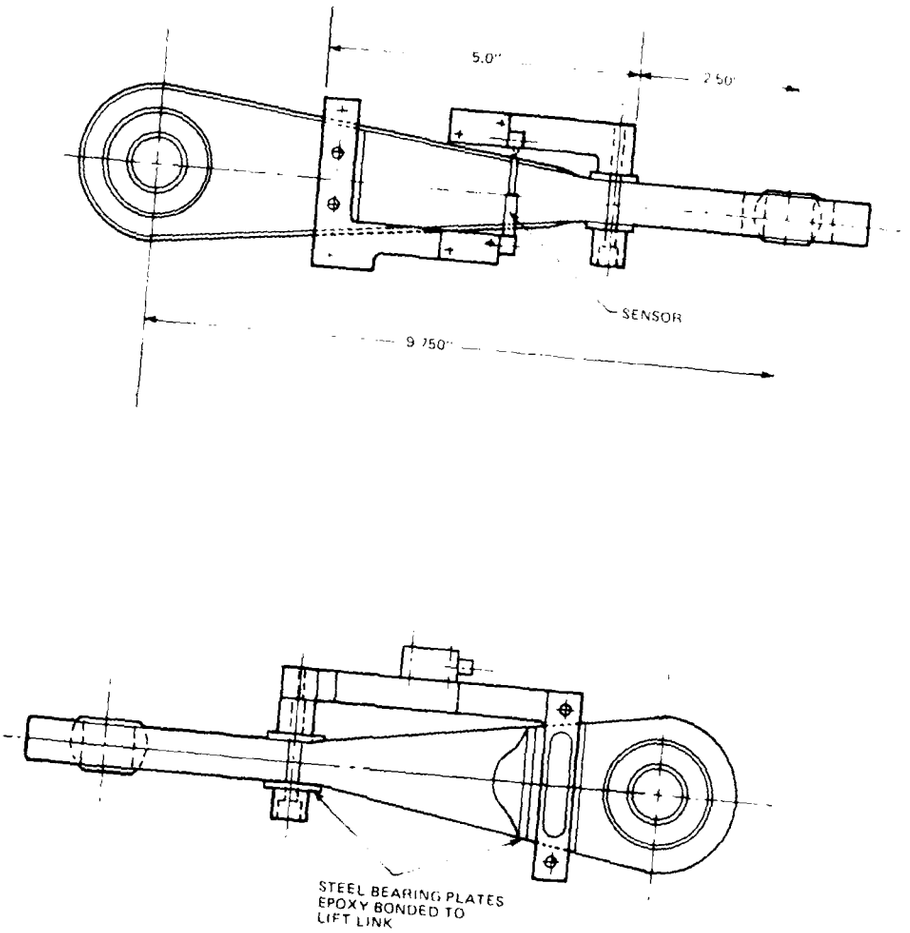


Figure 1. AH-1S Helicopter Lift-Link Sensor Bracket.

The operating temperature range is -50°F to +200°F. The temperature zero shift is ±0.3 mV/°F at 10V excitation.

STATIC TESTING AT THE CONTRACTOR'S FACILITY

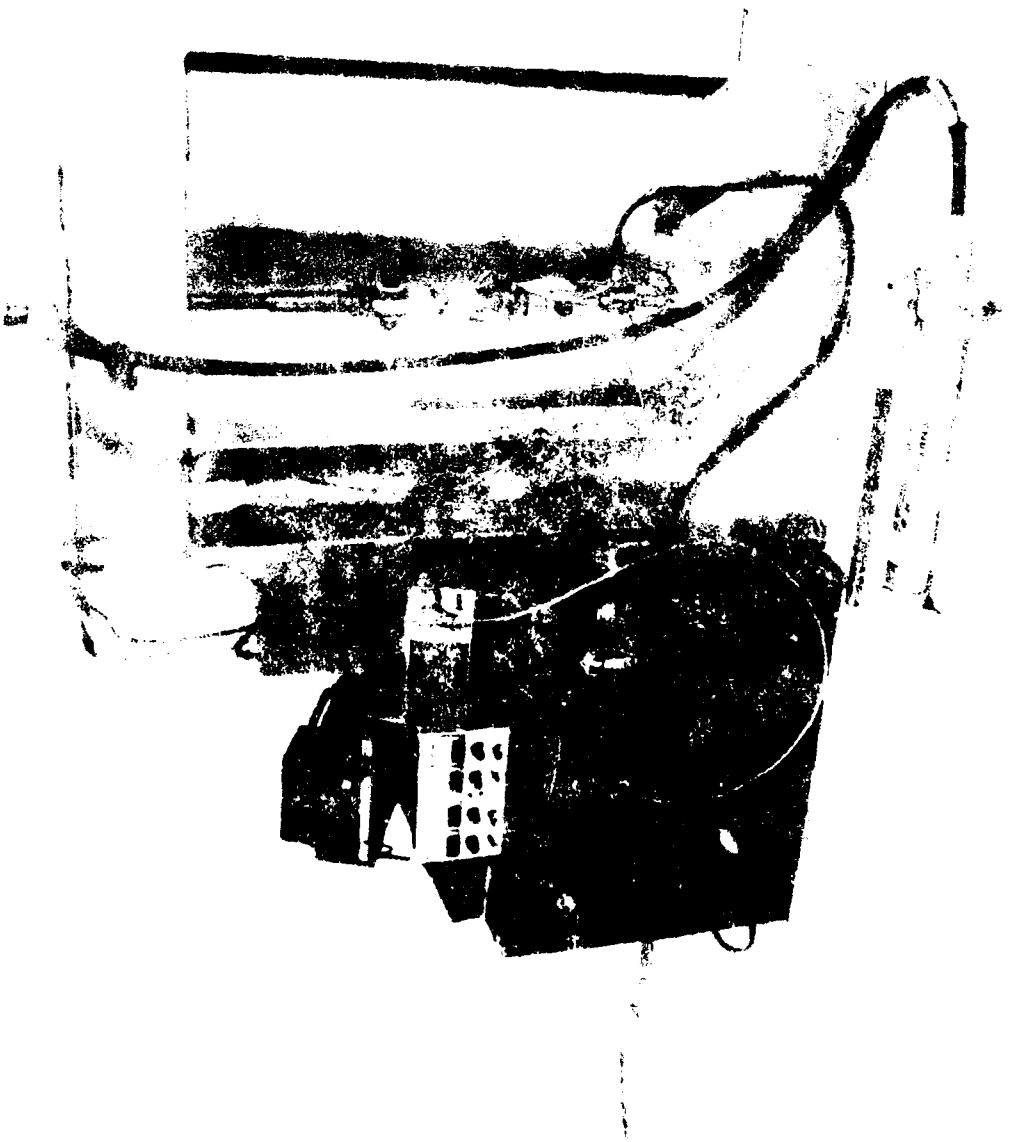
The lift-link assemblies were functionally tested in a static load hydraulic test frame as shown in Figure 2. The static tests covered a load range of 0 to 11,000 lb. An additional load of 1,000 lb was applied to assure a margin for satisfactory performance. Three data runs were performed with each lift-link assembly to verify linearity, repeatability, and hysteresis characteristics of the measuring system. Figures 3, 4, and 5 represent three sequential load tests which show the performance of the measuring system under static load application.

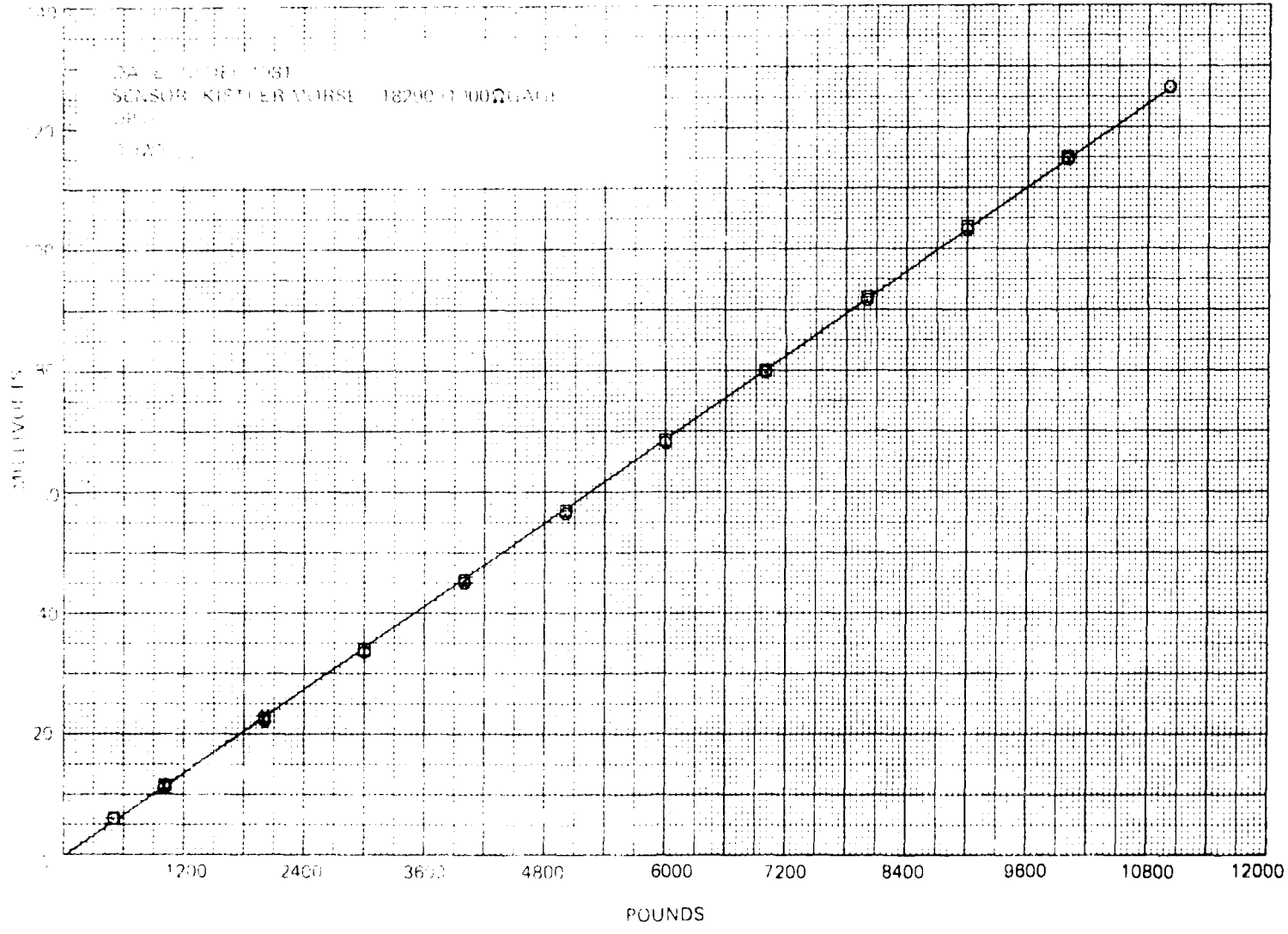
DYNAMIC TESTING AT THE APPLIED TECHNOLOGY LABORATORY

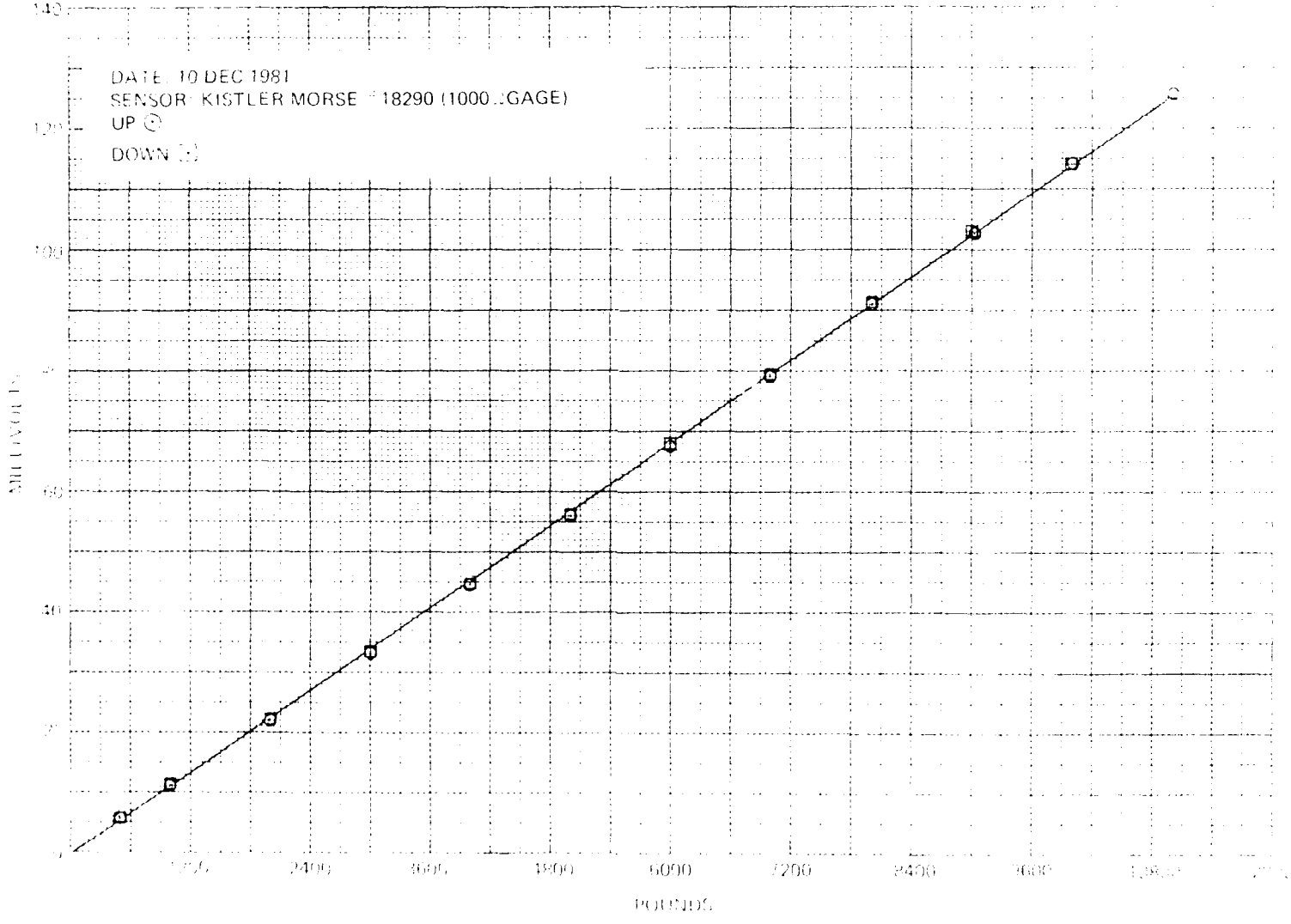
Instrumented lift-link assembly #1 was installed in a 10,000-lb servo-hydraulic fatigue test machine. An electronic function generator was used to apply a ramp load to the assembly from 0 to 10,000 lb and then back to 0. An x-y plotter was used to plot the output of the lift-link strain sensor on the y-axis and the output of the load cell on the x-axis. The gains of the x and y channels were adjusted for a deflection of 10 chart inches at a load of 10,000 lb. After this test, the link was cycled for 50,000 cycles with a mean load of 7,000 lb and an alternating load of 1,000 lb. A second static test was performed at the conclusion of the fatigue test. The post-fatigue test revealed greater hysteresis than the pre-fatigue test.

Because the static test revealed some nonlinearities that were not apparent in the test completed at the contractor's facility, three additional tests were performed as follows:

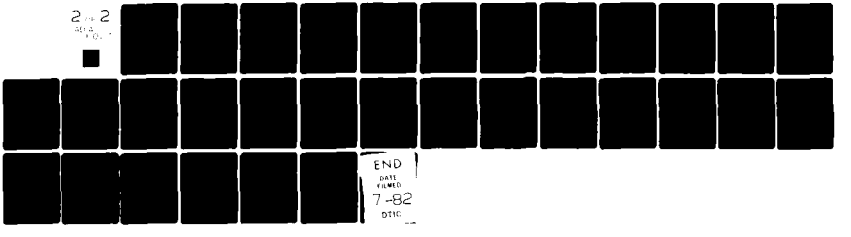
a. The load link output was plotted on the y-axis versus time on the x-axis before the fatigue test.

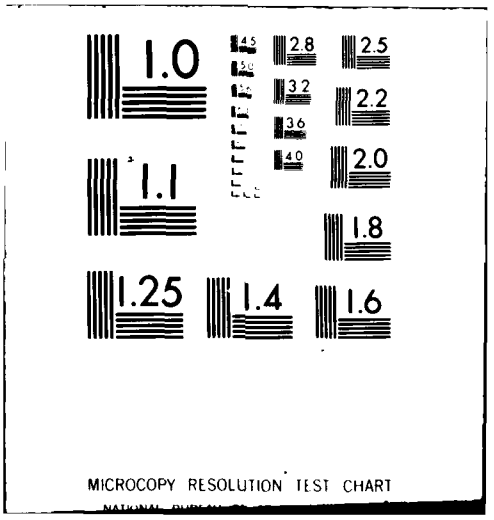



1200
2400
3600
4800
6000
7200
8400
9600
10800
12000
POUNDS


DATE 10 DEC 1981
SENSOR KISTLER MORSE 18290 (1000 GAGE)
UP
DOWN
POUNDS

AD-A116 027 TECHNOLOGY INC DAYTON OH F/G 1/4
DEVELOPMENT OF A STRUCTURAL INTEGRITY RECORDING SYSTEM (SIRS) F--ETC(U)
MAY 82 J G DOTSON, A W KOLB DAAK51-81-C-0035
UNCLASSIFIED USAAVRADCOM-TR-82-D-8 NL




1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
MICROCOPY RESOLUTION TEST CHART

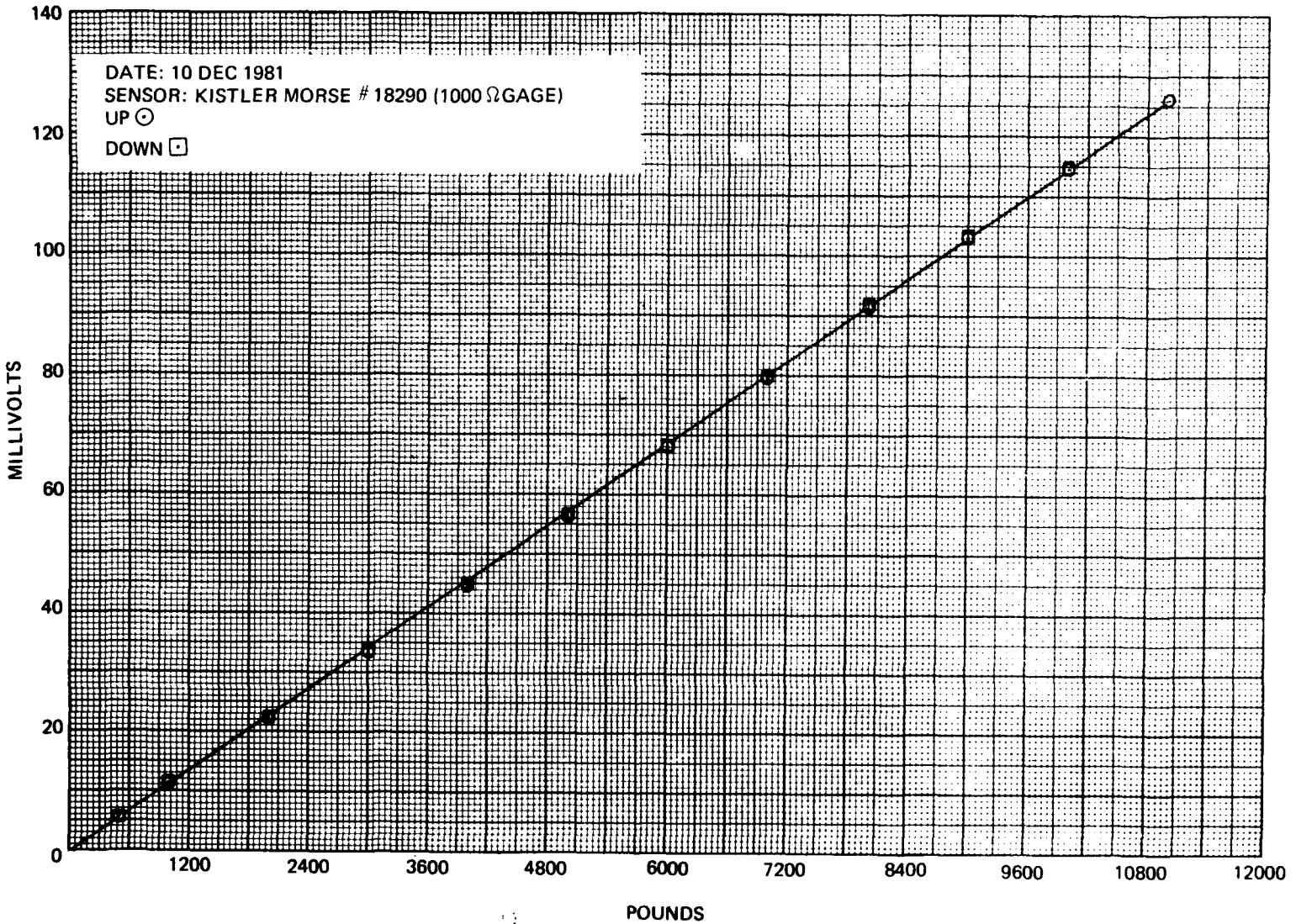


Figure 5. Static Test Plot No. 3.

b. The load link output was plotted on the y-axis versus time on the x-axis after the fatigue test.

c. The load cell output was plotted on the y-axis versus time on the x-axis.

The results of the above testing are reported in Figure 6. They show that the nonlinearity is attributed to the lift link and not to the load cell. Although there is some nonlinearity in the output of the instrumented lift link, it is primarily at the low end of the load range. When used with a SIRS, the output would be used in the 7,500-10,000-lb range. The performance of the link is adequate in this range.

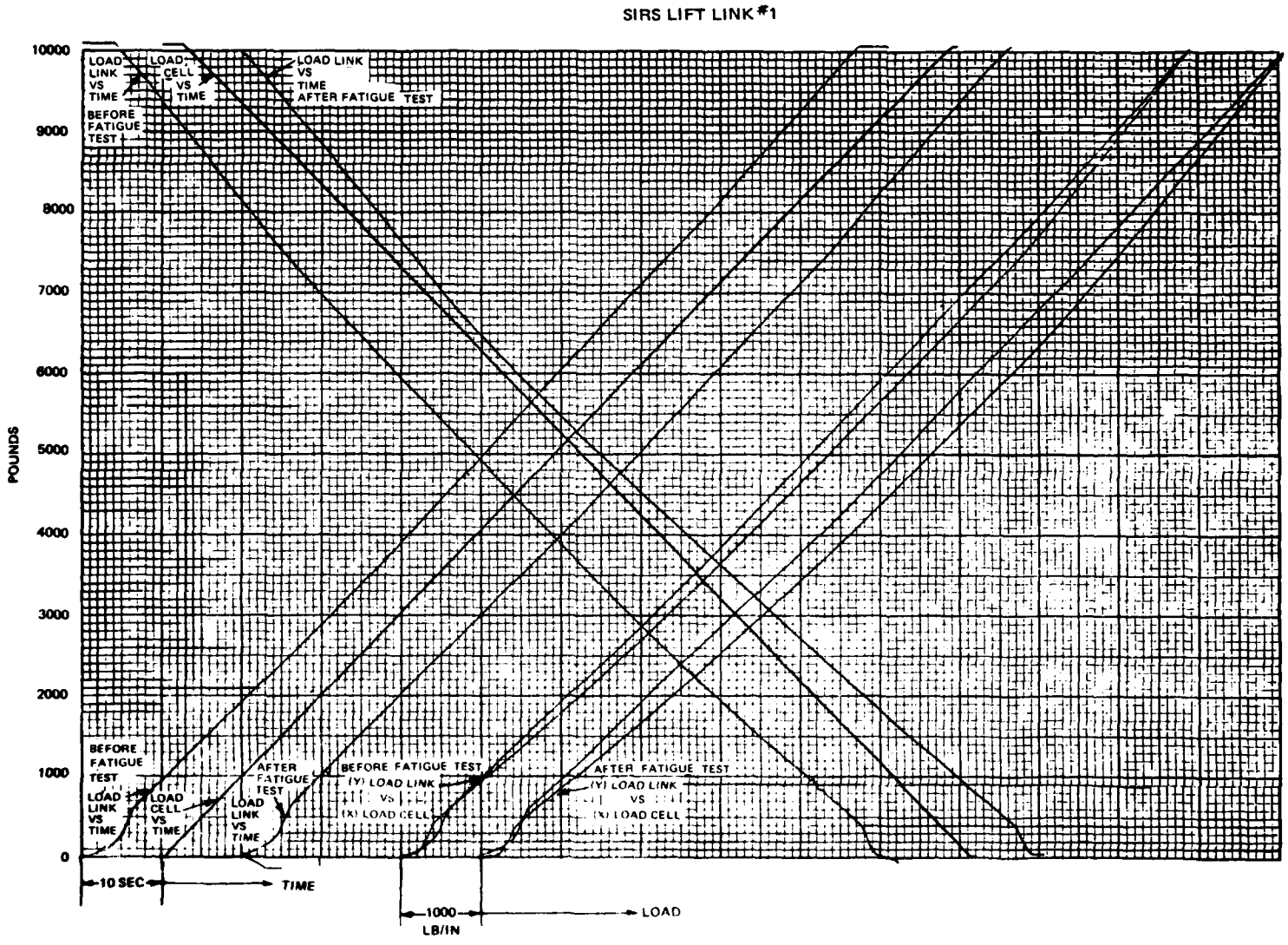


Figure 6. Lift-Link Assembly #1 Dynamic Test.

CONCLUSIONS

The work performed under this contract resulted in a workable Fatigue Damage Assessment System (FDAS) for AH-1S helicopter dynamic components. In conjunction with flight data recorded by the SIRS flight recorder system it is now possible to compute accumulated fatigue damage from operational data and assess the actual versus assumed fatigue damage.

The lift-link sensor system has been redesigned and should operate satisfactorily under the operational conditions encountered. If flight tests indicate the need for further improvements in gross weight measurements, the possibility of instrumenting transmission mounts and rotor control linkages should be considered. From the output of these sensors the rotor thrust can be computed by the SIRS recorder for all flight conditions. This effort could be performed as a follow-on program after flight evaluation of the lift-link gross weight sensor performance.

After completion of the program discussed in this report, it can be concluded that the results obtained establish a sound basis for a future program consisting of SIRS recorder flight measurements on AH-1S helicopters to establish a data base for a statistical evaluation of operational damage of critical dynamic helicopter components.

RECOMMENDATIONS

As a result of the work described in this report, several improvements are recommended to achieve operational status of the SIRS recorder system and effective utilization of the fatigue damage assessment program. These improvements include application of the FDAS program to the AH-1S production-type helicopter components and further enhancement of the gross weight measuring system. In addition, relatively minor modifications to the SIRS recorder will further improve reliability and accuracy of recorded flight test data.

1. Evaluation of Bell AH-1S Production-Type Helicopter Component Fatigue Life

The data contained in Reference 4 apply for the developmental model AH-1S helicopter only. The component overhaul and retirement schedule for the AH-1S production helicopter as listed in TM55-1520-236-23 includes dynamic components with different part numbers and updated retirement schedules. The FDAS program used in this report is based on the modified AH-1S version and applies to the large number of this type of aircraft in service. In a future effort this program could be adapted to the production AH-1S aircraft components.

2. Gross Weight Measuring System Enhancement

The redesigned lift-link assembly should be flight-tested in a production AH-1S helicopter together with a SIRS recorder. In addition, an oscillograph recording system should be installed in parallel with the SIRS recorder. After completion of a specific flight test program the performance of the lift-link system should be evaluated to determine its proper functioning for the purpose of measuring gross weight.

In the case that flight test results indicate that errors are introduced by collective and cyclic pitch control forces as

indicated in Reference 5, it is suggested that consideration be given to instrumenting the pertinent control components. A similar problem may exist with the transmission mounts through which a varying amount of rotor thrust may be transmitted. If necessary, it is recommended that the transmission mounts also be instrumented. These additional measurements would be recorded and processed by the SIRS recorder and could significantly contribute to gross weight measurement accuracy.

The planned flight tests to determine lift-link performance will also present an opportunity to utilize the lift-link signal for takeoff and landing detection in conjunction with the SIRS recorder. The landing and takeoff detection method developed during the preceding program could not be thoroughly evaluated due to the short time remaining on the contract and the non-interference aspects of the mission requirements for the helicopters at Fort Rucker. Therefore, it is recommended that the lift-link strain sensor signal be used; this will provide a more reliable and direct way to detect landing and takeoff.

3. Improvements in System Reliability and Cost

The SIRS recorder uses lithium batteries to power its non-volatile memory components. Extensive operational experience has shown that these batteries have a service life of about one-half of the expected 1-year period. This deficiency can probably be overcome by modifying the circuits involved. However, it would be prudent to investigate the latest available technology in nonvolatile memory devices that do not require battery backup and make a cost benefit evaluation between the two approaches.

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[5] Lewis, R.B. II, Bailes, E.E., McClellan, R.D., et al, "Engineering Flight Test AH-1G Helicopter (Huey Cobra) Maneuvering Limitations," Final Report, U.S. Army Aviation Systems Test Activity, Edwards Air Force Base, CA, March 1971.

Calibration of on-board sensor channels is a requirement that cannot presently be performed on an independent, noninterference basis. A modification to the recorder that may correct this problem and result in improved operating efficiency should be investigated.

Also, since the initial development of the SIRS recorder, newer technology microcomputer devices have evolved. These devices have many more functions integrated onto a single chip and as such it should be possible to reduce the chip count of the recorder. This would make possible an even smaller package and provide even higher reliability.

REFERENCES

1. Dotson, J.G., and Kolb, A.W., "Structural Integrity Recording System (SIRS) for U.S. Army AH-1S Helicopters," Technology Incorporated, USAAVRADCOM Technical Report TR 81-D-6, Applied Technology Laboratory, U.S. Army Research and Technology Laboratories (AVRADCOM), Ft. Eustis, VA, March 1981, AD A098236.

2. Johnson, R.B., Martin, G.L., and Moran, M.S., "A Feasibility Study for Monitoring Systems of Fatigue Damage to Helicopter Components," Technology Incorporated; USAAMRDL Technical Report 74-92, Eustis Directorate, U.S. Army Air Mobility Research and Development Laboratory, Ft. Eustis, VA, January 1975, AD A06641.

3. Farrell, T.G., Johnson, R.B., and Tyler, M.C. - Technology Incorporated, "Structural Integrity Recording System (SIRS) for U.S. Army AH-1G Helicopters," USAAVRADCOM TR-80-D-15, Applied Technology Laboratory, U.S. Army Research and Technology Laboratories (AVRADCOM), Ft. Eustis, VA, March 1981, AD A097283.

4. Cassady, B., and Arlt, E., "Fatigue Life Substantiation of the Dynamic Components for the AH-1R/S Helicopter," Bell Helicopter Textron Report 209-099-466, November 1975.

5. Lewis, R.B. II, Bailes, E.E., McClellan, R.D., et al, "Engineering Flight Test AH-1G Helicopter (Huey Cobra) Maneuvering Limitations," Final Report, U.S. Army Aviation Systems Test Activity, Edwards Air Force Base, CA, March 1971.

APPENDIX A. FDAS PRINTOUTS

SIRS SPECTRUM USAGE

AIRCRAFT: 76-22568 LOG TIME: 753.9 RETRIEVAL DATE: 20/ 3/80 REASON: SCHEDULED
RECORDER: 1003 BASE: 1
DELTA LOG TIME: 7.0 HOURS
VALUES PER 100 HOURS WERE COMPUTED USING THE RETRIEVAL TIME.
******* INDICATES AN INVALID FLIGHT CONDITION VALUE

DENSITY ALTITUDE HISTOGRAM
ALTITUDE (K FT)

	<1	1	2	3	4	5	6	7	8	9	10	TOTAL
RETRIEVAL	0.1	2.6	1.7	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.9
PER 100 HRS	2.6	53.8	34.2	9.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	100.0
FLT COND NRS	126	127	128	129	130	131	132	133	134	135	136	

RPM HISTOGRAM
RPM

	<314	314	319	324	329	334	339	TOTAL
RETRIEVAL	0.2	1.0	3.6	0.0	0.0	0.0	0.0	4.9
PER 100 HRS	4.1	20.5	74.0	0.8	0.2	0.0	0.5	100.0
FLT COND NRS	137	138	139	140	141	142	143	

TORQUE HISTOGRAM
TORQUE (PSI)

	<10	10	20	30	40	50	TOTAL
RETRIEVAL	0.4	1.6	2.8	0.2	0.0	0.0	4.9
PER 100 HRS	8.5	32.4	56.0	3.1	0.0	0.0	100.0
FLT COND NRS	144	145	146	147	148	149	

SIRS SPECTRUM USAGE

AIRCRAFT: 76-22568 LOG TIME: 753.9 RETRIEVAL DATE: 20/ 3/80 REASON: SCHEDULED
RECORDER: 1003 BASE: 1
DELTA LOG TIME: 7.0 HOURS
VALUES PER 100 HOURS WERE COMPUTED USING THE RETRIEVAL TIME.
******* INDICATES AN INVALID FLIGHT CONDITION VALUE

FLIGHT CONDITION	GROSS WEIGHT (LB)	TIME (HOURS) RETRIEVAL	TIME (HOURS) PER 100 HOURS	OCCURRENCE RETRIEVAL	OCCURRENCE PER 100 HOURS
FLIGHT TIME	TOTAL	4.9	100.0		
1	<7750	0.9	18.9		
2	7750-8750	4.0	81.1		
3	>8750	0.0	0.0		
GROUND TIME	TOTAL	2.0	11.4		
4		2.0	41.4		
ROTOR CYCLES	TOTAL			77	1564
5				77	1564
NORMAL LANDINGS	TOTAL			20	406
6				20	406
AUTOROTATIVE LANDINGS	TOTAL			56	1138
7				56	1138
HOVER A/S <.3 VH	TOTAL	1.0	20.6		
8	<7750	0.0	0.0		
9	7750-8750	1.0	20.6		
10	>8750	0.0	0.0		
CRUISE A/S .3-.5 VH	TOTAL	0.4	8.2		
11	<7750	0.1	2.9		
12	7750-8750	0.3	5.3		
13	>8750	0.0	0.0		
CRUISE A/S .5-.6 VH	TOTAL	0.3	6.7		
14	<7750	0.1	2.6		
15	7750-8750	0.2	4.1		
16	>8750	0.0	0.0		
CRUISE A/S .6-.7 VH	TOTAL	0.1	1.1		
17	<7750	0.0	0.3		
18	7750-8750	0.0	0.8		
19	>8750	0.0	0.0		
CRUISE A/S .7-.8 VH	TOTAL	0.0	0.0		
20	<7750	0.0	0.0		
21	7750-8750	0.0	0.0		
22	>8750	0.0	0.0		
CRUISE A/S .8 .9 VH	TOTAL	0.0	0.0		
23	<7750	0.0	0.0		
24	7750-8750	0.0	0.0		
25	>8750	0.0	0.0		
CRUISE A/S .9 1.0 VH	TOTAL	0.0	0.0		
26	<7750	0.0	0.0		
27	7750-8750	0.0	0.0		
28	>8750	0.0	0.0		

SIRS SPECTRUM USAGE

AIRCRAFT: 76-22568 LOG TIME: 753.9 RETRIEVAL DATE: 20/ 3/80 REASON: SCHEDULED
RECORDER: 1003 BASE: 1
DELTA LOG TIME: 7.0 HOURS
VALUES PER 100 HOURS WERE COMPUTED USING THE RETRIEVAL TIME.
******* INDICATES AN INVALID FLIGHT CONDITION VALUE

FLIGHT CONDITION	GROSS WEIGHT (LB)	TIME (HOURS) RETRIEVAL	TIME (HOURS) PER 100 HOURS	OCCURRENCE RETRIEVAL	OCCURRENCE PER 100 HOURS
CRUISE A/S 1.0 1.1 VH	TOTAL	0.0	0.0		
29	<7750	0.0	0.0		
30	7750-8750	0.0	0.0		
31	>8750	0.0	0.0		
CRUISE A/S > 1.1 VH	TOTAL	0.0	0.0		
32	<7750	0.0	0.0		
33	7750-8750	0.0	0.0		
34	>8750	0.0	0.0		
CLIMB A/S .5 VH	TOTAL	0.0	0.6		
35	<7750	0.0	0.0		
36	7750-8750	0.0	0.6		
37	>8750	0.0	0.0		
DESCENT A/S .5 VH	TOTAL	0.1	2.8		
38	<7750	0.0	0.4		
39	7750-8750	0.1	2.4		
40	>8750	0.0	0.0		
ACCELERATION TO CLIMB	TOTAL	0.0	0.0		
41	<7750	0.0	0.0		
42	7750 8750	0.0	0.0		
43	>8750	0.0	0.0		
FLARE	TOTAL			1	20
44	<7750			0	0
45	7750-8750			1	20
46	>8750			0	0
NORMAL TURNS A/S <.5 VH	TOTAL	0.1	2.8		
47	<7750	0.0	0.0		
48	7750 8750	0.1	2.8		
49	>8750	0.0	0.0		
NORMAL TURNS A/S .5-.7 VH	TOTAL	0.1	1.5		
50	<7750	0.0	0.0		
51	7750 8750	0.1	1.5		
52	>8750	0.0	0.0		
NORMAL TURNS A/S .7-.9 VH	TOTAL	0.0	0.0		
53	<7750	0.0	0.0		
54	7750-8750	0.0	0.0		
55	>8750	0.0	0.0		
NORMAL TURNS A/S >.9 VH	TOTAL	0.0	0.0		
56	<7750	0.0	0.0		
57	7750 8750	0.0	0.0		
58	>8750	0.0	0.0		

SIRS SPECTRUM USAGE

AIRCRAFT: 76-2256B LOG TIME: 753.9 RETRIEVAL DATE: 20/ 3/80 REASON: SCHEDULED
RECORDER: 1003 BASE: 1
DELTA LOG TIME: 7.0 HOURS
VALUES PER 100 HOURS WERE COMPUTED USING THE RETRIEVAL TIME.
******* INDICATES AN INVALID FLIGHT CONDITION VALUE

FLIGHT CONDITION	GROSS WEIGHT (LB)	TIME (HOURS) RETRIEVAL	TIME (HOURS) PER 100 HOURS	OCCURRENCE RETRIEVAL	OCCURRENCE PER 100 HOURS
GUNNERY TURN A/S <.5 VH	TOTAL	0.0	0.6		
59	<7750	0.0	0.0		
60	7750-8750	0.0	0.6		
61	>8750	0.0	0.0		
GUNNERY TURN A/S .5-.7 VH	TOTAL	0.0	0.0		
62	<7750	0.0	0.0		
63	7750-8750	0.0	0.0		
64	>8750	0.0	0.0		
GUNNERY TURN A/S .7-.9 VH	TOTAL	0.0	0.0		
65	<7750	0.0	0.0		
66	7750-8750	0.0	0.0		
67	>8750	0.0	0.0		
GUNNERY TURN A/S >.9 VH	TOTAL	0.0	0.0		
68	<7750	0.0	0.0		
69	7750-8750	0.0	0.0		
70	>8750	0.0	0.0		
GUN S TURN A/S <.5 VH	TOTAL	0.0	0.0		
71	<7750	0.0	0.0		
72	7750-8750	0.0	0.0		
73	>8750	0.0	0.0		
GUN S TURN A/S .5-.7 VH	TOTAL	0.0	0.0		
74	<7750	0.0	0.0		
75	7750-8750	0.0	0.0		
76	>8750	0.0	0.0		
GUN S TURN A/S .7-.9 VH	TOTAL	0.0	0.0		
77	<7750	0.0	0.0		
78	7750-8750	0.0	0.0		
79	>8750	0.0	0.0		
GUN S TURN A/S >.9 VH	TOTAL	0.0	0.0		
80	<7750	0.0	0.0		
81	7750-8750	0.0	0.0		
82	>8750	0.0	0.0		
SYMMETRICAL DIVE	TOTAL	0.0	0.0		
83	<7750	0.0	0.0		
84	7750-8750	0.0	0.0		
85	>8750	0.0	0.0		
ASYMMETRICAL DIVE	TOTAL	0.0	0.0		
86	<7750	0.0	0.0		
87	7750-8750	0.0	0.0		
88	>8750	0.0	0.0		

SIRS SPECTRUM USAGE

AIRCRAFT: 76-22563 LOG TIME: 754.9 RETRIEVAL DATE: 20/ 3/80 REASON: SCHEDULED
RECORDER: 1003 BASE: 1
DELTA LOG TIME: 7.0 HOURS
VALUES PER 100 HOURS WERE COMPUTED USING THE RETRIEVAL TIME.
******* INDICATES AN INVALID FLIGHT CONDITION VALUE

FLIGHT CONDITION	GROSS WEIGHT (LB)	TIME (HOURS) RETRIEVAL	TIME (HOURS) PER 100 HOURS	OCCURRENCE RETRIEVAL	OCCURRENCE PER 100 HOURS
SYMMETRICAL PULLUP	TOTAL	0.0	0.0		
89	≤7750	0.0	0.0		
90	7750-8750	0.0	0.0		
91	≥8750	0.0	0.0		
ASYMMETRICAL PULLUP	TOTAL	0.0	0.0		
92	≤7750	0.0	0.0		
93	7750-8750	0.0	0.0		
94	≥8750	0.0	0.0		
AUTOROTATIVE TIME	TOTAL	0.5	10.1		
95	≤7750	0.2	3.3		
96	7750-8750	0.3	6.8		
97	≥8750	0.0	0.0		
AUTOROTATIVE TURNS NZ ≤1.5 G	TOTAL	0.1	1.8		
98	≤7750	0.0	0.0		
99	7750-8750	0.1	1.8		
100	≥8750	0.0	0.0		
AUTOROTATIVE TURNS NZ ≥1.5 G	TOTAL	0.0	0.2		
101	≤7750	0.0	0.0		
102	7750-8750	0.0	0.2		
103	≥8750	0.0	0.0		

104	RPM PEAK VALUE	360.3
105	TORQUE PEAK VALUE	31.5
106	VL PEAK VALUE	0.5
107	VH PEAK VALUE	0.6
108	DENSITY ALTITUDE PEAK	1666.0
109	VERTICAL ACCELERATION PEAK	2.9
110	OAT MAXIMUM VALUE	16.0
111	OAT MINIMUM VALUE	14.0
112	GROSS WEIGHT PEAK VALUE	0.0
113	ROLL PEAK	54.0

SIRS SPECTRUM USAGE

AIRCRAFT: 76 22563 LOG TIME: 753.9 RETRIEVAL DATE: 20/ 3/80 REASON: SCHEDULED
RECORDER: 1003 BASE: 1
DELTA LOG TIME: 7.0 HOURS
VALUES PER 100 HOURS WERE COMPUTED USING THE RETRIEVAL TIME.
******* INDICATES AN INVALID FLIGHT CONDITION VALUE

FLIGHT CONDITION	GROSS WEIGHT (LB)	TIME (HOURS) RETRIEVAL	TIME (HOURS) PER 100 HOURS	OCCURRENCE RETRIEVAL	OCCURRENCE PER 100 HOURS
NZ PEAKS 1.1-1.3 G	TOTAL			417	8474
114	<7750			70	1422
115	7750-8750			347	7052
116	>8750			0	0
NZ PEAKS 1.3-1.5 G	TOTAL			46	934
117	<7750			0	0
118	7750-8750			46	934
119	>8750			0	0
NZ PEAKS 1.5-1.7 G	TOTAL			7	142
120	<7750			0	0
121	7750-8750			7	142
122	>8750			0	0
NZ PEAKS >1.7 G	TOTAL			4	81
123	<7750			0	0
124	7750-8750			4	81
125	>8750			0	0

SIRS SPECTRUM USAGE

AIRCRAFT: 76-22563 LOG TIME: 753.9 RETRIEVAL DATE: 20/ 3/80 REASON: SCHEDULED
RECORDER: 1003 BASE: 1
DELTA LOG TIME: 7.0 HOURS
VALUES PER 100 HOURS WERE COMPUTED USING THE RETRIEVAL TIME.
******* INDICATES AN INVALID FLIGHT CONDITION VALUE

AIRSPEED VS TORQUE BY RUDDER POSITION

RUDDER POSITION: -10%

A/S (VH)	TORQUE (PSI) <10	10	20	30	40	50	TOTAL	FLIGHT CONDITIONS
<.5 PER 100 HRS								150-155
.5 PER 100 HRS								156-161
.7 PER 100 HRS								162-167
.9 PER 100 HRS								168 1/3
****TOTAL PER 100 HRS								

AIRSPEED VS TORQUE BY RUDDER POSITION

RUDDER POSITION: 10-20%

A/S (VH)	TORQUE (PSI) <10	10	20	30	40	50	TOTAL	FLIGHT CONDITIONS
<.5 PER 100 HRS			0.0 0.1	0.0 0.1			0.0 0.2	174-179
.5 PER 100 HRS								180-185
.7 PER 100 HRS								186-191
.9 PER 100 HRS								192-197
****TOTAL PER 100 HRS			0.0 0.1	0.0 0.1			0.0 0.2	

SIKS SPECTRUM USAGE

AIRCRAFT: 76-22568 LOG TIME: 753.9 RETRIEVAL DATE: 20/ 3/80 REASON: SCHEDULED
RECORDER: 1003 BASE: 1
DELTA LOG TIME: 7.0 HOURS
VALUES PER 100 HOURS WERE COMPUTED USING THE RETRIEVAL TIME.
******* INDICATES AN INVALID FLIGHT CONDITION VALUE

AIRSPEED VS TORQUE BY RUDDER POSITION

RUDDER POSITION: 20-40%

A/S (VH)	TORQUE (PSI) <10	10	20	30	40	50	TOTAL	FLIGHT CONDITIONS
<.5	0.0	0.0	0.8	0.0			0.8	196-203
PER 100 HRS	0.2	0.3	15.5	0.7			16.7	
.5								204-209
PER 100 HRS								
.7								210-215
PER 100 HRS								
.9								216-221
PER 100 HRS								
****TOTAL	0.0	0.0	0.8	0.0			0.8	
PER 100 HRS	0.2	0.3	15.5	0.7			16.7	

AIRSPEED VS TORQUE BY RUDDER POSITION

RUDDER POSITION: 40-60%

A/S (VH)	TORQUE (PSI) <10	10	20	30	40	50	TOTAL	FLIGHT CONDITIONS
<.5	0.0	0.4	1.0	0.1			1.5	222-227
PER 100 HRS	0.9	7.5	20.0	1.6			30.1	
.5	0.0	0.1	0.3	0.0			0.4	228-233
PER 100 HRS	0.0	1.7	6.3	0.4			8.3	
.7		0.0					0.0	234-239
PER 100 HRS		0.0					0.0	
.9								240-245
PER 100 HRS								
****TOTAL	0.0	0.5	1.3	0.1			1.9	
PER 100 HRS	1.0	9.2	26.2	2.0			38.4	

SIRS SPECTRUM USAGE

AIRCRAFT: 76-22568 LOG TIME: 753.9 RETRIEVAL DATE: 20/ 3/80 REASON: SCHEDULED
RECORDER: 1003 BASE: 1
DELTA LOG TIME: 7.0 HOURS
VALUES PER 100 HOURS WERE COMPUTED USING THE RETRIEVAL TIME.
******* INDICATES AN INVALID FLIGHT CONDITION VALUE

AIRSPEED VS TORQUE BY RUDDER POSITION

RUDDER POSITION: 60-80%

A/S (VH)	TORQUE (PSI) <10	10	20	30	40	50	TOTAL	FLIGHT CONDITIONS
<.5	0.3	0.8	0.4	0.0			1.5	246-251
PER 100 HRS	5.9	16.9	7.9	0.1			30.9	
.5	0.0	0.3	0.3	0.0			0.6	252-257
PER 100 HRS	0.8	5.8	6.3	0.1			12.9	
.7	0.0	0.0					0.0	258-263
PER 100 HRS	0.0	0.1					0.1	
.9								264-269
PER 100 HRS								
****TOTAL	0.3	1.1	0.7	0.0			2.2	
PER 100 HRS	6.7	22.8	14.1	0.2			43.9	

AIRSPEED VS TORQUE BY RUDDER POSITION

RUDDER POSITION: 80-90%

A/S (VH)	TORQUE (PSI) <10	10	20	30	40	50	TOTAL	FLIGHT CONDITIONS
<.5	0.0	0.0					0.0	270-275
PER 100 HRS	0.4	0.1					0.5	
.5								276-281
PER 100 HRS								
.7								282-287
PER 100 HRS								
.9								288-293
PER 100 HRS								
****TOTAL	0.0	0.0					0.0	
PER 100 HRS	0.4	0.1					0.5	

SINS SPECTRUM USAGE

AIRCRAFT: 76-22568 LOG TIME: 753.9 RETRIEVAL DATE: 20/ 3/80 REASON: SCHEDULED
RECORDER: 1003 BASE: 1
DELTA LOG TIME: 7.0 HOURS
VALUES PER 100 HOURS WERE COMPUTED USING THE RETRIEVAL TIME.
******* INDICATES AN INVALID FLIGHT CONDITION VALUE

AIRSPEED VS TORQUE BY RUDDER POSITION

RUDDER POSITION: -90%

A/S (KN)	TORQUE (PSI) <10	10	20	30	40	50	TOTAL	FLIGHT CONDITIONS
.5 PER 100 HRS								294-299
.5 PER 100 HRS								300-305
.7 PER 100 HRS								306-311
.9 PER 100 HRS								312-317
****TOTAL PER 100 HRS								

COMPONENT DAMAGE

AIRCRAFT: 76-22968 LOG TIME: 763.9 RETRIEVAL DATE: 20Z 3.80 REASON: SCHEDULED
RECORDER: 1003 BASE: 1
DELTA LOG TIME: 7.9 HOURS
DELTA RECORDER TIME: 4.9 HOURS
******* INDICATES AN INVALID FLIGHT CONDITION VALUE

COMPONENT	STRUCTURAL DAMAGE	FLIGHT HOUR DAMAGE RECORDER	LOG
MAIN ROTOR BLADE	0.00489	0.00147	0.00636
MAIN ROTOR YOKE EXTENSION	0.00000	0.00127	0.00212
MAIN ROTOR GRIP	0.00000	0.00047	0.00070
MAIN ROTOR PITCH HORN	0.00001	0.00075	0.00106
RETENTION STRAP FITZNUT	0.00698	0.00214	0.00918
SWASHPLATE DRIVE LINK	0.00000	0.0005	0.00084
SWASHPLATE OUTER RING	0.00000	0.00011	0.00012
SWASHPLATE INNER RING	0.00001	0.00049	0.00071
HYDRAULIC BOOST CYLINDER	0.00001	0.00149	0.00212
TAIL ROTOR BLADE	0.00000	0.00000	0.00000

AIRCRAFT: 76-22568 LOG TIME: 753.7 RETRIEVAL DATE: 20/ 3/80 REASON: SCHEDULED
RECORDER: 1003 BASE: 1
DELTA LOG TIME: 7.0 HOURS

FLIGHT CONDITION VALUES USED IN THE DAMAGE CALCULATION.
VALUES ARE IN HOURS.
INVALID FLIGHT CONDITIONS HAVE BEEN FLAGGED WITH A NEGATIVE SIGN OR ASTERISKS.

TFCC 1- 10	0.9983	0.9921	0.0000	0.0346	0.1925	0.1111	0.2333	0.0000	1.6151	0.0000
TFCC 11- 20	0.1441	0.2587	0.0000	0.1280	0.2018	0.0000	0.0151	0.0309	0.0000	0.0000
TFCC 21- 30	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TFCC 31- 40	0.0000	0.0000	0.0000	0.0000	0.0000	0.0311	0.0000	0.0181	0.1191	0.0000
TFCC 41- 50	0.0000	0.0000	0.0000	0.0000	0.0042	0.0000	0.0000	0.1357	0.0000	0.0000
TFCC 51- 60	0.0715	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0301
TFCC 61- 70	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TFCC 71- 80	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TFCC 81- 90	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TFCC 91-100	0.0000	0.0000	0.0000	0.0000	0.0116	0.0117	0.0000	0.0000	0.0829	0.0000
TFCC 101 110	0.0000	0.0098	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TFCC 111-120	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TFCC 121-130	0.0000	0.0000	0.0000	0.0000	0.0000	0.1269	0.6478	1.6823	0.4554	0.0077
TFCC 131-140	0.0000	0.0000	0.0000	0.0000	0.0000	0.0007	0.7002	1.0071	3.6414	0.0390
TFCC 141-150	0.0078	0.0023	0.0224	0.4173	1.0942	0.7573	0.1516	0.0000	0.0000	0.0000
TFCC 151-160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TFCC 161-170	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TFCC 171-180	0.0000	0.0000	0.0000	0.0000	0.0000	0.0058	0.0035	0.0000	0.0000	0.0000
TFCC 181-190	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TFCC 191-200	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0081	0.0144	0.7633
TFCC 201 210	0.0356	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TFCC 211-220	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.6000
TFCC 221 230	0.0000	0.0456	0.3711	0.9822	0.0811	0.0000	0.0000	0.0014	0.0817	0.3086
TFCC 231-240	0.0186	0.0000	0.0000	0.0000	0.0008	0.0000	0.0000	0.0000	0.0000	0.0000
TFCC 241-250	0.0000	0.0000	0.0000	0.0000	0.0000	0.2922	0.8336	0.3875	0.0069	0.0000
TFCC 251-260	0.0000	0.0375	0.2858	0.3083	0.0056	0.0000	0.0000	0.0011	0.0025	0.0000
TFCC 261-270	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0214
TFCC 271-280	0.0053	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TFCC 281-290	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TFCC 291-300	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0030
TFCC 301-310	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TFCC 311-320	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0107	0.0000
TFCC 321-330	0.0000	0.0000	0.0000	0.0691	0.2623	0.0000	0.0000	0.2030	0.0000	0.0691
TFCC 331-332	0.2623	0.0000								

COMPONENT DAMAGE

AIRCRAFT: 76-22568 LOG TIME: 753.9 RETRIEVAL DATE: 20/ 3/80 REASON: SCHEDULED
RECORDER: 1003 BASE: 1
DELTA LOG TIME: 7.0 HOURS
INCREMENTAL DAMAGE TABLE
VALUES ARE FRACTIONAL PORTION OF INCREMENTAL FATIGUE DAMAGE

MAIN ROTOR BLADE

FCC	1- 10	0.00000	0.00000	0.00000	0.00000	0.00280	0.00000	0.00090	0.00000	0.00000	0.00000
FCC	11- 20	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	21- 30	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	31- 40	0.00000	0.00000	0.00000	0.00000	0.00000	0.00012	0.00000	0.00000	0.00003	0.00000
FCC	41- 50	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	51- 60	0.00006	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00001
FCC	61- 70	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	71- 80	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	81- 90	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	91-100	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00002	0.00000	0.00000	0.00000
FCC	101-110	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	111-120	0.00000	0.00000	0.00000	0.00000	0.00060	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	121-130	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	131-140	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	141-150	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	151-160	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	161-170	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	171-180	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	181-190	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	191-200	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	201-210	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	211-220	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	221-230	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	231-240	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	241-250	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	251-260	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	261-270	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	271-280	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	281-290	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	291-300	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	301-310	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	311-320	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00010	0.00000
FCC	321-330	0.00000	0.00000	0.00000	0.00000	0.00015	0.00000	0.00000	0.00075	0.00000	0.00000
FCC	331-332	0.00000	0.00000								

COMPONENT DAMAGE

AIRCRAFT: 76-22568 LOG TIME: 753.9 RETRIEVAL DATE: 20/ 3/80 REASON: SCHEDULED
RECORDER: 1003 BASE: 1
DELTA LOG TIME: 7.0 HOURS
INCREMENTAL DAMAGE TABLE
VALUES ARE FRACTIONAL PORTION OF INCREMENTAL FATIGUE DAMAGE

MAIN ROTOR YOKE EXTENSION

FCC	1- 10	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	11- 20	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	21- 30	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	31- 40	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	41- 50	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	51- 60	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	61- 70	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	71- 80	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	81- 90	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	91-100	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	101-110	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	111-120	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	121-130	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	131-140	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	141-150	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	151-160	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	161-170	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	171-180	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	181-190	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	191-200	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	201-210	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	211-220	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	221-230	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	231-240	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	241-250	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	251-260	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	261-270	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	271-280	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	281-290	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	291-300	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	301-310	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	311-320	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	321-330	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	331-332	0.00000	0.00000								

COMPONENT DAMAGE

AIRCRAFT: 76-22568 LOG TIME: 753.9 RETRIEVAL DATE: 20/ 3/80 REASON: SCHEDULED
RECORDER: 1003 BASE: 1
DELTA LOG TIME: 7.0 HOURS
INCREMENTAL DAMAGE TABLE
VALUES ARE FRACTIONAL PORTION OF INCREMENTAL FATIGUE DAMAGE

MAIN ROTOR GRIP

FCC	1- 10	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	11- 20	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	21- 30	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	31- 40	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	41- 50	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	51- 60	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	61- 70	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	71- 80	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	81- 90	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	91 100	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	101-110	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	111-120	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	121-130	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	131 140	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	141-150	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	151 160	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	161-170	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	171-180	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	181-190	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	191 200	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	201-210	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	211-220	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	221-230	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	231-240	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	241-250	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	251-260	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	261-270	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	271-280	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	281-290	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	291-300	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	301-310	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	311-320	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	321-330	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	331 332	0.00000	0.00000								

COMPONENT DAMAGE

AIRCRAFT: 76-22568 LOG TIME: 753.9 RETRIEVAL DATE: 20/ 3/80 REASON: SCHEDULED
RECORDER: 1003 BASE: 1
DELTA LOG TIME: 7.0 HOURS
INCREMENTAL DAMAGE TABLE
VALUES ARE FRACTIONAL PORTION OF INCREMENTAL FATIGUE DAMAGE

MAIN ROTOR PITCH HORN

FCC	1- 10	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	11- 20	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	21- 30	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	31- 40	0.00000	0.00000	0.00000	0.00000	0.00000	0.00001	0.00000	0.00000	0.00000	0.00000
FCC	41- 50	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	51- 60	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	61- 70	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	71- 80	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	81- 90	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	91-100	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	101-110	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	111-120	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	121-130	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	131-140	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	141-150	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	151-160	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	161-170	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	171-180	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	181-190	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	191 200	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	201-210	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	211-220	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	221-230	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	231-240	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	241-250	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	251-260	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	261-270	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	271-280	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	281-290	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	291-300	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	301-310	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	311 320	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	321-330	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	331-332	0.00000	0.00000								

COMPONENT DAMAGE

AIRCRAFT: 76-22568 LOG TIME: 753.9 RETRIEVAL DATE: 20/ 3/80 REASON: SCHEDULED
RECORDER: 1003 BASE: 1
DELTA LOG TIME: 7.0 HOURS
INCREMENTAL DAMAGE TABLE
VALUES ARE FRACTIONAL PORTION OF INCREMENTAL FATIGUE DAMAGE

RETENTION STRAP FTG/NUT

FCC	1- 10	0.00000	0.00000	0.00000	0.00000	0.00698	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	11- 20	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	21- 30	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	31- 40	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	41- 50	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	51- 60	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	61- 70	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	71- 80	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	81- 90	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	91-100	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	101-110	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	111-120	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	121-130	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	131-140	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	141-150	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	151 160	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	161-170	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	171-180	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	181-190	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	191 200	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	201-210	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	211 220	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	221-230	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	231-240	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	241-250	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	251-260	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	261-270	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	271 280	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	281-290	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	291-300	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	301-310	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	311-320	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	321-330	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	331-332	0.00000	0.00000								

COMPONENT DAMAGE

AIRCRAFT: 76-22560 LOG TIME: 753.7 RETRIEVAL DATE: 20/ 3/80 REASON: SCHEDULED
RECORDER: 1003 BASE: 1
DELTA LOG TIME: 7.0 HOURS
INCREMENTAL DAMAGE TABLE
VALUES ARE FRACTIONAL PORTION OF INCREMENTAL FATIGUE DAMAGE

SWASHPLATE DRIVE LINK

FCC	1- 10	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	11- 20	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	21- 30	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	31- 40	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	41- 50	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	51- 60	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	61- 70	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	71- 80	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	81- 90	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	91-100	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	101-110	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	111-120	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	121-130	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	131-140	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	141-150	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	151-160	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	161-170	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	171-180	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	181-190	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	191-200	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	201-210	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	211-220	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	221-230	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	231-240	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	241-250	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	251-260	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	261-270	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	271-280	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	281-290	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	291-300	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	301-310	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	311-320	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	321-330	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	331-332	0.00000	0.00000								

COMPONENT DAMAGE

AIRCRAFT: 76 22568 LOG TIME: 753.9 RETRIEVAL DATE: 207 1780 REASON: SCHEDULED
RECORDER: 1003 BASE: 1
DELTA LOG TIME: 7.0 HOURS
INCREMENTAL DAMAGE TABLE
VALUES ARE FRACTIONAL PORTION OF INCREMENTAL FATIGUE DAMAGE

SWASHPLATE OUTER RING

FCC	1- 10	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	11- 20	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	21- 30	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	31- 40	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	41- 50	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	51- 60	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	61- 70	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.0 000	0.00000	0.00000
FCC	71- 80	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	81- 90	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	91 100	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	101-110	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	111 120	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	121-130	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	131-140	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	141-150	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	151-160	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	161-170	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	171-180	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	181-190	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	191-200	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	201-210	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	211 220	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	221-230	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	231-240	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	241-250	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	251-260	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	261-270	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	271-280	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	281-290	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	291-300	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	301-310	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	311-320	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	321-330	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	331 332	0.00000	0.00000								

COMPONENT DAMAGE

AIRCRAFT: 76-22563 LOG TIME: 753.9 RETRIEVAL DATE: 20/ 3/80 REASON: SCHEDULED
RECORDER: 1003 BASE: 1
DELTA LOG TIME: 7.0 HOURS
INCREMENTAL DAMAGE TABLE
VALUES ARE FRACTIONAL PORTION OF INCREMENTAL FATIGUE DAMAGE

SWASHPLATE INNER RING

FCC	1- 10	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	11- 20	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	21- 30	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	31- 40	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	41- 50	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	51- 60	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	61- 70	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	71- 80	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	81- 90	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	91 100	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	101-110	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	111-120	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	121-130	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	131 140	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	141-150	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	151-160	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	161-170	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	171-180	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	181-190	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	191 200	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	201-210	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	211-220	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	221-230	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	231-240	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	241-250	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	251-260	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	261-270	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	271-280	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	281-290	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	291-300	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	301-310	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	311 320	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	321-330	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	331-332	0.00000	0.00000								

COMPONENT DAMAGE

AIRCRAFT: 78-22568 LOG TIME: 753.9 RETRIEVAL DATE: 20/ 3/00 REASON: SCHEDULED
RECORDER: 1003 BASE: 1
DELTA LOG TIME: 7.0 HOURS
INCREMENTAL DAMAGE TABLE
VALUES ARE FRACTIONAL PORTION OF INCREMENTAL FATIGUE DAMAGE

HYDRAULIC BOOST CYLINDER

FCC	1- 10	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	11- 20	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	21- 30	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	31- 40	0.00000	0.00000	0.00000	0.00000	0.00000	0.00001	0.00000	0.00000	0.00000	0.00000
FCC	41- 50	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	51- 60	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	61- 70	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	71- 80	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	81- 90	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	91-100	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	101-110	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	111-120	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	121-130	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	131-140	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	141-150	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	151-160	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	161-170	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	171-180	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	181-190	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	191-200	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	201-210	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	211-220	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	221-230	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	231-240	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	241-250	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	251-260	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	261-270	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	271-280	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	281-290	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	291-300	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	301-310	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	311-320	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	321-330	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC	331-332	0.00000	0.00000								

COMPONENT DAMAGE

AIRCRAFT: 76-22563 LOG TIME: 753.7 RETRIEVAL DATE: 07/ 3/80 REASON: SCHEDULED
RECORDER: 1003 BASE: 1
DELTA LOG TIME: 7.0 HOURS
INCREMENTAL DAMAGE TABLE
VALUES ARE FRACTIONAL PORTION OF INCREMENTAL FATIGUE DAMAGE

TAIL ROTOR BLADE

FCC 1- 10	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 11- 20	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 21- 30	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 31- 40	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 41- 50	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 51- 60	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 61- 70	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 71- 80	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 81- 90	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 91-100	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 101-110	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 111-120	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 121-130	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 131-140	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 141-150	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 151-160	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 161-170	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 171-180	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 181-190	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 191-200	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 201-210	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 211-220	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 221-230	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 231-240	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 241-250	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 251-260	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 261-270	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 271-280	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 281-290	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 291-300	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 301-310	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 311-320	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 321-330	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
FCC 331-332	0.00000	0.00000								

EOJ - FDAS PROGRAM

ABBREVIATIONS

A/S	Indicated Airspeed
EPROM	Erasable Programmable Read-Only Memory
FCC	Flight Condition Category
FCM	Flight Condition Monitoring
FCMMOD	Flight Condition Category Damage Rate Calculation Program
FDAS	Fatigue Damage Assessment System
GW	Gross Weight
H-GW	High Gross Weight
IGE	In Ground Effect
IPS	Initial Processing System
L-GW	Low Gross Weight
M-GW	Medium Gross Weight
OAT	Outside Air Temperature
OCC	Occurrence
OGE	Out of Ground Effect
SIRS	Structural Integrity Recording System
V_H	Maximum Attainable (Level Flight) Velocity
V_L	Limit Velocity

LIST OF SYMBOLS

D	Total damage to a component accumulated during exposure to the usage spectrum
D_k	Component damage accrued during the k^{th} flight condition category
C_k	Damage rate in k^{th} flight condition category for a particular component
T_k	Amount of flight time spent in k^{th} flight condition category
T_t	Total flight time
FL	Component fatigue life
m	Number of flight condition categories

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